The Chemical Age

A Weekly Journal Devoted to Industrial & Engineering Chemistry

VOL. V. AUGUST 27, 1921 No. 115

Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to "The Chemical Age" is 21/- per annum for the United Kingdom, and 26/- abroad. Cheques, P.O.O.'s, and Postal Orders should be made payable to Benn Brothers, Ltd.

Editorial & General Offices—8, Bouverie Street, London, E.C.4.
Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (4 lines).

Colonial Trade

IN the search for markets for the export trade which the nation so much needs attention turns naturally in the first instance to the great fields represented by our own Colonies and Dependencies. Large as these are, they are still commercially in their infancy, and no limits can at present be set to their future. Even where we have to deal with an old civilisation like that of India and an immense native population the possibilities are almost equally large, though in a different way, for the natural resources, under the influence of scientific and commercial treatment and direction, may be capable of many new industrial applications, and there is the possibility of new industries requiring British capital, plant, and scientific or technological managers. No better picture of such possibilities could be desired than that presented by Dr. E. R. Watson in his recent address before the Indian Science Congress, which is reproduced in this issue. Dr. Watson discusses with knowledge and in detail the possibilities of industrial development in India and the part which chemists, chemical engineers, and chemical traders must take in it. India is considered to be deficient at present in raw materials for the production of organic chemicals from coal, but experts who have examined the problem are of opinion that there is an enormous field for the production of compounds from vegetable products. Increasing attention is now being paid to vegetation as a natural source of liquid fuel and many other products, and here it remains for chemical research to show what can be made of India's rich stores in this field.

In the case of Colonies like Australia, Canada, South Africa, and New Zealand the conditions are quite different, but the opportunities even larger. Canada has already developed certain chemical industries with remarkable success. South Africa's metallurgical industries are too familiar to need more than mention. What is possible there is possible through the whole range of our possessions, and the combined resources exploited and pooled might make the Empire completely independent of foreign sources.

As the result of recent experiences the relation between the home country and our overseas dominions has become much more intimate. It is desirable from every point of view that this feeling should be developed by increasing intercolonial trade. In time our Colonies will become a series of markets of continental dimensions, and it is essential that from the earliest stage they should be trained to look for their supplies to home producers. Similarly, as their own natural resources are developed and productive industries expand, we should be able to draw more and more upon them for the things not produced at home. One method suggested for accomplishing this is to put a fiscal ring round the Empire and work intensively within it. The better method we believe to be the free play of commercial intercourse, based on affinity of race and mutual service. An indispensable element in the latter is the wide diffusion of trade knowledge by personal representatives, trade literature, and trade journals. The present issue of THE CHEMICAL AGE, which will be widely circulated through our Colonies, is an example of enterprise in this direction, and those who make use of its pages for reaching new customers are pursuing a policy which is sound and patriotic and which in the long run is bound to pay. It was the merchant adventurers of past days who laid the foundations of British international trade; it is to their successors, with their world-wide system of distribution, we must look for linking up the sellers and the buyers throughout the whole of our Empire.

Dust Explosions

THE risks run from explosions in dusty atmospheres of all kinds are so little appreciated that in many instances almost a callous indifference is displayed towards the matter. Some short time ago we drew attention in these columns to the dangers of rubber dust, but this is but one material in a formidable list. Theoretically, any inflammable material will explode when finely divided and mixed with a sufficient quantity of air. The explosibility of a substance depends upon its composition, its fineness, and the amount of moisture present in it. If the composition is such that the material will burn, its dust may explode if fine enough and dry enough to form a cloud, and if mixed with the right amount of air. Our New York contemporary *Chemical Age* recently published a highly informative article on the subject, the main points in which are well worth attention in this country. The manner in which such explosions occur is described, as well as the necessary preventive measures. For instance, a dust explosion often consists in a series of small explosions, producing a sound resembling the roll of thunder. The primary explosion usually occurs in a cloud of dust occupying a comparatively small space. The percussive disturbance produced by the primary explosion throws other dust in its vicinity into a state of suspension, and this in its turn is fired, with the result that still more dust is stirred up and exploded. To prevent the explosion of an inflammable dust two things are evidently important: (1) to avoid the formation of dust clouds, and (2) to eliminate all sources of ignition, such as open flames, static electric sparks, sparks from foreign matter in grinding machines, highly overheated bearings, improper electric insulation, and every other condition that might start explosive combustion.

In grain elevators and other places where grain is stored, the vapour of carbon bisulphide has been used quite extensively for killing weevil and other forms of insect life. This practice is dangerous, and if it is considered necessary to use carbon bisulphide in this way, the operation should be supervised by some specially responsible person who understands the dangers thoroughly, and who has full authority to take every precaution, from the time when the exposure first begins, up to the time when the grain and the storage space and all adjoining rooms and premises have been thoroughly ventilated.

We mention this phase of the explosion problem because we believe that the combustion or explosion of carbon bisulphide vapour has been the initiating cause of some of the worst dust explosions that have occurred. The vapour does not readily mix with still air, because it is usually heavy. It is likely to lie along the floor, or to be dammed up in the bottom of a bin or other enclosure, for a considerable time. Moreover, it takes fire at a surprisingly low temperature. It is particularly important to bear in mind, however, that the dust need not even be organic in nature, because metallic dusts of certain kinds are notably explosive when diffused through the air in favourable proportions. Our contemporary calls attention to one explosion in which the dust in the exhaust ventilating pipes of a plant manufacturing aluminium ware became ignited, apparently from a spark produced by a piece of iron wire getting wound up on the exhaust fan. In this case six girls were killed and as many more were injured.

Plastic Fuel

WE have recently received from the United States Bureau of Mines a most interesting account of the studies which have been made of the Trent fuel cleaning process. Briefly, the process consists in agitating a mixture of powdered coal, water and oil. This produces a partly de-ashed plastic fuel, called an amalgam, the oil selecting the coal particles and largely excluding the water and ash. The amalgam can be freed from the water it holds by mechanically working it much the same as butter is worked. When a mixture of pulverised coal and water is agitated with oil in an amount equal to 30 per cent. of the weight of the coal, a clean separation of a considerable part of the mineral matter is obtained. The carbonaceous material forms with the oil a pasty agglomerate which is heavier than water, while the mineral matter which was physically separated from the carbonaceous material by the fine pulverisation remains suspended and can be drawn off with the water. If an oil is used which can be distilled at a temperature below the distilling temperature of the coal, powdered fuel is reclaimed from the amalgam, and the oil may be re-used. If a heavy oil be used and distilled to dryness, a coke product may be recovered, although the coal treated may have had no coking quality. If the distillation proceeds only to a heavy pitch, a mass suitable for briquetting may be made.

In distilling oil mixed with a finely powdered material the distillates are similar to those obtained by distilling under pressure, so that the distillation of an amalgam of coal and oil gives quantities often more favourable than the sum of the separate distillations of the coal and the oil. The amalgam can be used for a gas-making fuel, while gasworks tar emulsions can be dehydrated by mixing with powdered coal, the amalgam being retorted for further gas making. It can be burned in several ways; for example: it may be shovelled or forced through pipes by pressure; it can also be stored under water if desired. The laboratory results immediately suggest many interesting possible applications, while, for pulverising fuel, wet grinding presents many advantages over dry grinding, provided the water can be eliminated afterwards. Of particular interest is the reduction of the sulphur content of the coal, especially as the removal of pyrites by selective action is considerably more difficult than is the elimination of other mineral matter. It has been found, however, that when treating anthracites the pyritic sulphur almost completely disappears, although, strangely, when bituminous coals are dealt with a considerable quantity of the pyrites still remains in the recovered product. The problem, however, would appear largely to be one of fineness of pulverisation.

The quantity of oil used amounts normally to 0·3 lb. per lb. of coal; or, if a coal contains 25 per cent. of removable refuse, it is necessary to add about 62 gallons of a light fuel oil per ton of raw coal treated. Although at first sight it might appear that a considerable quantity of oil would be lost as a result of emulsification with the water, experiments have shown that

there is no appreciable waste owing to this course. The Trent process, it may be noted, is unique among coal-cleaning methods, in that it treats the coal in a very finely pulverised condition; and, perhaps, the most noteworthy feature of the operation of the process is the clean manner in which combustible and undesirable mineral matter are separated.

Trade in Key Industries

WE do not wish to magnify the grievances of traders under recent legislation, but the arrangements for putting into operation Part I. of the Key Industries Act will probably put numbers of importers to considerable inconvenience. The Act, which received the Royal Assent last week, as we indicated it would, comes into operation on October 1. On that date, no doubt, goods already on order will be still on their way here, and at the time they were ordered no tax was due on them. It would have seemed reasonable to allow a certain period for the clearing of goods on order, so as to relieve the importer of a tax he had not provided for. The Board of Trade, however, state definitely that all goods included in the key industries schedule will be liable to duty if they arrive on or after October 1, no matter how long before that date they may have been on order. The operation of the Act thus becomes in effect retrospective. Up to the end of last week no trader could have been quite certain that the Act would be passed, nor, if passed, when it would come into operation. He had to choose, therefore, between suspending his trade altogether long before the Act was passed or embarking on it in uncertainty as to whether his goods would be taxed or not. If his orders happen to come through before October 1, he will be free; if they are delayed, he will have to pay a duty he did not reckon on.

Similarly, the importer is kept in a state of suspense as to the detailed list of articles to be included in the schedule of key industries, including synthetic organic chemicals, etc. The measure is already an Act, but the actual articles in detail to which it applies are not known with the exactness a trader requires, nor will the list be available for a week yet or more. From the point of view of the administration of the Act, these matters are probably of little interest to the Department concerned. To the business man, however, they are of very real importance, and it would have been wise and considerate in applying the measure to take account of merchants' commitments and allow some short period of grace.

Board of Trade Reform

THE Industries and Manufactures Department of the Board of Trade includes in its scope the chemical and allied industries, and it is interesting to note the judgment on the Department of the Hilton Young Committee, which has been investigating the staffing and methods of the Board of Trade. This department comprises a number of technical officers engaged in the acquisition and maintenance of an intimate technical knowledge of certain industries and manufactures, which is frequently put at the disposal of individual manufacturers applying for help and guidance as to processes of manufacture. It appears to the Committee that to give such advice, in the case of certain industries only, involves a discrimination between one industry and another which cannot be justified. Further, it recommends that the Board should utilise the expert staffs of the Department of Scientific and Industrial Research rather than that "a partially duplicate service of experts should be maintained for purposes not, in the Committee's opinon, directly related to the Board's essential functions." It is but fair to add that the Board of Trade, in a memorandum on the Report, defends the retention of the technical staff, and Sir Frank Heath, the head of the Scientific and Industrial Research Department, testifies that there has been no overlapping between the staffs of the two departments.

The Threatened Strike

ALTHOUGH, at the moment we go to press, the dispute between the employers and workmen in the chemical trades is not settled, earnest efforts continue in pursuit of a settlement. Under the strike notices recently issued, work should cease to-day; but the terms of this notice will probably be extended unless negotiations are completely broken off. The issue in principle is a big one—whether there should be a "cut" in wages. If the principle itself were in dispute, there would be ground for a strenuous fight; but the principle has been accepted by the men, and the question is now confined to a difference of a penny an hour. That, of course, is not unimportant; but it is not of sufficient importance to justify the stoppage of a great industry at a time when it should be working for national recovery. The issues have been so narrowed that we cannot believe the parties will fail to come to terms.

The Calendar

Sept. 5–6	Iron & Steel Institute: Autumn Meeting	Comité des Forges de France, 7, Rue de Madrid, Paris.
7–14	British Association for the Advancement of Science: 89th Meeting; Presidential Address by Sir Edward Thorpe.	Edinburgh.
Sept. 19–Oct. 29	Royal Photographic Society of Great Britain: 66th Annual Exhibition.	35, Russell Square, London.
Sept. 21–23	Institute of Metals: Annual Meeting	Birmingham.
28	Faraday Society: General Discussion on "Catalysis with Special Reference to Newer Theories of Chemical Action."	—
Oct. 5	Chemical Industry Club: Address by Sir William J. Pope, K.B.E.	Whitehall Court, London.
7	Society of Chemical Industry: Annual Dinner	Connaught Rooms, Kingsway, London.
8	Mining Institute of Scotland: General Meeting.	Edinburgh.

Book Received

SULPHUR AND SULPHUR DERIVATIVES. By Harold A. Auden. London: Sir Isaac Pitman & Sons, Ltd. Pp. 101. 3s. net.

Electrometric Control in Chemical Industry

By Dr. Eric K. Rideal

DURING the last few years electrometric methods in physico-chemical measurements have made great advances both in precision and in simplicity. At one period the determination of small electro-motive forces with an accuracy of ± one millivolt was a matter of extreme difficulty and the improvised apparatus necessary for work of this character could conveniently be housed only in a University or the research laboratory of a large organisation. At the present time there are on the market several types of apparatus relatively simple in character and capable of a much higher degree of accuracy, which can be manipulated by the average chemist or engineer, and are entirely suitable for the routine of industrial testing.

The two most important electrometric methods which are finding increasing applications in semi-industrial work are the determination of electric conductivity and the measurement of electromotive forces.

Electric Conductivity Methods

Minor applications of the principles involving the determination of both metallic and electrolytic resistance are to be found in scientific apparatus. Of the former the most important is the determination of temperature by the well-known resistance thermometer in which advantage is taken of the alteration of the resistance of metals, such as platinum, with the temperature. Extensions of this principle are found in the electric gas flow meters in which the flow rates of gases in tubes are measured by the loss of heat of a metal spiral as determined by its resistance supplied with a definite amount of energy from the external source. The determination of traces of combustible gases in oxygen or vice versa has been accomplished by coating the metal spiral with an active catalytic metal such as platinum, the thermal energy liberated by the surface combustion producing a proportionate change in the temperature and conductivity of the spiral. Possible applications of the method may be found in metallurgical practice for testing the purity of metals or checking the composition of alloys. Progress of heat treatment and hot or cold working can likewise in many cases be followed by alterations in metallic conductivity. Thus drawn copper has a specific resistance of $1{\cdot}78\ 10^{-6}$ cm. ohms, whilst the specific resistance of the same metal well annealed sinks to $1{\cdot}59\ 10^{-6}$ cm. ohms. Even larger changes occur during the annealing of the various irons and steels. The determination of electrolytic conductivity requires for accurate work a carefully designed conductivity cell and an alternating current of suitable periodicity and wave form, both factors which present grave difficulties in technical development. Attempts to solve the problem of an industrial apparatus for the determination of electrolytic conductivity have usually not adopted the Wheatstone bridge set up but consist essentially of a current measuring device operating in conjunction with a suitable type of conductivity cell and a constant E.M.F. The conductivity χ of the electrolyte in the conductivity cell at constant temperature is given by the expression $\chi=\frac{C}{E-E'}x=$K.C. where E is the applied E.M.F. E' the back E.M.F. of polarisation and x the cell constant. Provided that E' the back E.M.F. of polarisation is zero or constant the method is an accurate one. Attempts to eliminate this factor by utilisation of an alternating current dynamo driven through a suitable slip ring governor so as to ensure a constant value of E have proved successful in several types of apparatus where a measure and not a chart record is desired. This type of apparatus is, however, naturally somewhat expensive. Another and cheaper method from the point of view of plant design is to apply a high direct current E.M.F. to a specially designed conductivity cell of very high internal resistance. Under these conditions E' may vary by, say, 0·5—1·0 volts as the conductivity of the electrolyte varies between its extreme ranges, whilst if E is 200 volts the error introduced by the variation of $E-E'$ from 199 to 201 is a relatively small one and negligible for industrial purposes.

There is much to be said for the conductivity method as opposed to the potentiometric method which we shall have occasion to describe, especially for solutions relatively dilute in respect to electrolytes. The conductivity of an electrolyte is directly proportional to the number of free ions, whilst the potential difference between an electrode and its electrolyte is proportional only to the logarithm of the ionic concentration. Evidently the former is the more sensitive method provided that the sensibilities of the two methods are of the same order.

Applications of the method are to be found in the various forms of salinometers where a record is obtained of the alteration in the conductivity of sea waters, condenser or feed water, and industrial liquids like tanning solutions. The determination of a constituent in a gaseous mixture can likewise be made with a modified apparatus of the same type. Thus carbon dioxide in air or other gases may be determined by absorption in baryta or lime water and noting the change in conductivity produced by the elimination of the calcium carbonate, a method extended to the determination of carbon in steels, ammonia in nitrogen-hydrogen mixtures containing this gas by simple absorption in water, and observing the increase in conductivity. Traces of acid vapours in gases may likewise be determined in a similar manner.

Potentiometric Methods

Potentiometric methods have, in addition to the now generally employed thermo-couple recording devices, found industrial application in three distinct fields of routine industrial processes: the use of the hydrogen electrode, electrometric titration of oxidising and reducing liquids, and the electrolytic analysis of alloys by the method of graded potential.

Physiologists were the first to draw attention to the importance of interpreting the term "acidity of a solution" in more accurate terms than the number of c.c. of a base required for neutralisation with a definite indicator. It was at once recognised that the acidity of a solution determined by this method was in reality no criterion of the true acidity, and that accurate values of the activity of the acid or base in any solution could not be obtained by titration, but only by some other method. The determination of the potential difference between a hydrogen electrode and the solution was, however, found to give a direct measure of the acidity or activity of the hydrogen ions.

The difference between the titrometric and electrometric values negligible in diluted solutions of strong acids and bases becomes increasingly important in concentrated solutions on the one hand, and in the presence of neutral salts or buffer solutions on the other, as is witnessed in the following experimental data of Michaelis :

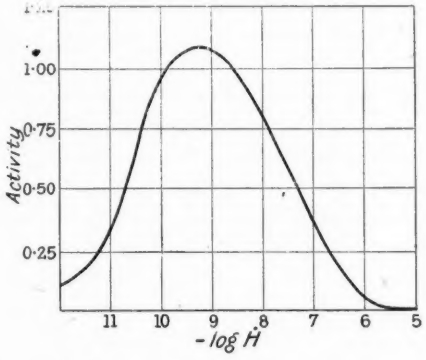
Solution	1	2	3
	$\frac{N}{1000}NaH_2PO_4$	$\frac{N}{100}NaH_2PO_4$	$\frac{N}{100}NaH_2PO_4$
H concentration	$\frac{N}{100}Na_2HPO_4$	$\frac{N}{10}Na_2HPO_4$	$\frac{N}{100}Na_2HPO_4$
	$2{\cdot}10^{-8}$	$2{\cdot}10^{-8}$	$2{\cdot}10^{-7}$
Titration value in c.c.N.NaOH per litre using phenol phthalein as indicator.	1	10	10

It will be observed that solutions 1 and 2 have the same hydrogen ion activity as determined electrometrically, a conclusion confirmed by the fact that the activity of trypsin in both these solutions was identical, yet titrometrically the second solution was found to be ten times as acid as the former. Again solutions 2 and 3 identical titrometrically are actually very different in acidity, a result again confirmed by the alteration in the enzyme activity.

Colour Indicators

The only convenient alternative to the utilisation of the electrometric method for the determination of the true acidity of such solutions is the colorimetric method of indicators using those of the phenol phthalein, or preferably those of the sulphone phthalein series. This latter method however, is open to the objection that many indicators exhibit a "salt effect," *i.e.*, the acidity at which the colour change takes place is dependent on the presence of neutral salts in the electrolyte, whilst others are readily adsorbed by colloidal matter present in many solutions to be tested.

Although this method was originally introduced for the standardisation of bateriological media, and the investigation of biochemical problems, the importance of enzymes in industrial chemical processes is now so great that a fuller appreciation of the value of the method is greatly to be desired. The large industries of leather tanning, glue manufacture, flax retting, tobacco, cocoa, coffee, tea curing



fermentations, and the ageing of wines and spirits are all dependent on enzymetic processes, and although the enzymes will operate over a relatively wide range of acidity, the rate and consequently plant output is very markedly affected by the hydrogen in concentration. In the following curve is shown the activity of trypsin on peptone as a function of the hydrogen in concentration.

It will be noted that a digester of four times the capacity for the same output would be required if the acidity were maintained at P =12 or P_H=5·5, than if the ophimum value of P_H=8·5 were rigorously adhered to. The breaking of colloidal emulsions, the flotation of ores, the precipitation of sludges, and many diverse operations in which interfacial forces are operative may likewise be mentioned as cases in which the determination of the hydrogen ion concentration may make or mar the operation. The importance of the method in deeply coloured liquids such as dye baths, extracts of various woods, and the like, is self evident. For the volumetric determination of solutions of oxidising or reducing agents, the electrometric method in many cases possesses advantages over the usual colorimetric end-point methods frequently adopted. The method is more sensitive, and can be adopted in cases where the liquids are highly coloured or tinted. Oxidising agents such as potassium permanganate can be directly titrated with ferrous sulphate utilising the potentiometric method of end-point indication.

In these simple cases there is, of course, but little advantage to be gained by such a procedure, since the end point as judged by the eye is sharp and distinct. In the case of the estimation of the elements manganese, chromium and vanadium in steels the solutions are frequently somewhat coloured. Under these conditions oxidation with ammonium persulphate and back titration with ferrous sulphate, utilising the electrometric control, possesses advantages. For the oxidation of leuco bases of various dyes and for the preparation of oxidation and reduction products in the fine chemical industry, *e.g.*, the preparation of the various reduction products of nitrobenzene or oxidation of p. phenylene diamine and similar substances, electrometric control is not only the most accurate but the only possible method which can be conveniently adopted.

An accurate record of traces of oxidising agents in water, such as ozone, chlorine, permanganates, which are generally employed as sterilising agents may readily be obtained with the aid of a platinum copper couple of suitable construction in conjunction with a simple recording microammeter, a method sensitive to less than one part in ten million and far quicker than the usual iodometric methods of estimation.

Attempts to utilise concentration cells other than electrodes of hydrogen or platinum electrodes in oxidising solutions for more general industrial applications have not yet been sufficiently developed. It is, however, evident that concentration cells in which one electrode is immersed in the solution containing the ion to be estimated or the concentration of which is to be controlled may be utilised in certain cases. Thus attempts have been made to record the oxygen content of the air, the presence of nitrous fumes in ammunition hoists on ships, the chlorine concentration of estuaries, and the removal of copper from solutions by thiocyanate precipitation electrometrically. The methods, however, do not appear to have received any general development, an indication that apparatus suitable for research purposes must in general undergo a marked metamorphosis before it is suitable for use under conditions where three hundred days work a year is demanded of it.

The industrial electro analysis of alloys of the non-ferrous metals received a great impetus by the introduction of the rapid methods of estimation.

Thus, by the use of a rotating electrode or preferably by agitation of the electrolyte employing co-axial gauze electrodes, analyses of metals can be completed in a few minutes.

The separation of metals by electro-deposition of one metal from a solution of the mixed salts, may readily be attained by adjusting the potential of the cathode in respect to the solution within the limits necessary for the deposition of the most electro negative metal in the electrolyte, an auxiliary calomel electrode and simple form of potentiometer being generally employed for this purpose. As an example of the general utility of the method it may be mentioned that a complete analysis of a silver copper alloy may be made in less than an hour.

Electrically operated self filling burettes and automatic titration apparatus of various types are usually to be found in the laboratories of the ingenious research chemist, but their general utility even if developed by the scientific instrument maker is frequently too limited to warrant any extensive development.

India to Manufacture Aluminium

A plan is reported to have been under consideration for the construction of a plant on the western coast of India to produce about 2,500 tons a year of ALUMINIUM FROM BAUXITE by the use of electricity. It is proposed to generate about 20,000 kilowatts by the construction of a large reservoir to collect and store the annual rainfall and the flow of a small stream, with a head of about 1,700 feet.

Chemical Research for the Industries of India

By E. R. Watson, M.A., D.Sc.

(*Principal of the Research Institute of the United Provinces, Cawnpore*)

In a recent address before the Indian Science Congress, Dr. E. R. Watson, who has charge of the establishment of a research institute for the Government of the United Provinces, dealt with the general question of the chemical researches likely to be most useful for the development of industries in that province.

IN attempting to answer the question what chemical researches are most urgently required and most likely to lead to important industrial developments in India, a somewhat wider question must first be tackled: namely, what industries involving chemistry are most capable of development or likely to develop in India. The two problems are not synonymous, as there may be industries involving chemistry which are capable of large and successful development in this country without the assistance of chemical research or with very little assistance. Again, this second question, as to what industries involving chemistry are capable of development, is evidently part of a still wider question, viz., that of the industrial development of India as a whole.

The United Provinces Government as early as 1907 considered the establishment of a technological institute at Cawnpore, of which one of the main functions was to be chemical research for the promotion of industries; and in several official communications it gave its views as to what chemical researches were most urgently required and most likely to be useful. The Industrial Commission's report (1918) has a chapter on the deficiencies in Indian industries. It points out the order in which industries have developed in other countries, viz., iron and steel manufacture first, then the production of textiles and similar goods by machinery, then the manufacture of chemicals required in these large scale industries. It points out India's deficiency in iron and steel production which has retarded the proper development of many industries dependent on machinery. It is remarked that "in the absence of any means for producing from purely Indian sources sulphuric, nitric and hydrochloric acids and alkalis, our manufactures, actual or prospective, of paper, drugs, matches, oils, explosives, disinfectants, dyes and textiles are dependent upon imports which under war conditions might be cut off." Yet "sources of raw materials for heavy chemicals are not deficient."

Drs. Sudborough and Simonsen have discussed chemical industries in the late Indian Munitions Board's Industrial Hand-book (1919). They there lay down the general principle that in any attempts to foster the development of chemical industries in India attention should be directed, in the first instance, to industries which make use of the Indian-grown raw materials now exported to other countries. Included in these exports are (1) the raw materials from which important fixed oils and feeding cakes are manufactured; (2) the raw materials from which valuable essential oils and medicinal drugs are prepared, and (3) various mineral products, such as chrome, manganese and zinc ores, wolfram and monazite sands. It is, however admitted that the proposition of making India an oil and oil-products exporting, rather than an oil-seeds exporting, country is not a simple one. In addition to such industries, it is recognised that the manufacture of heavy chemicals is a key industry or group of key industries; and, as to their prospects, it is considered, firstly, that the manufacture of sulphuric acid from zinc concentrates is promising; secondly, that sufficient nitric acid for some time to come can suitably be obtained from Indian nitre (the utilisation of atmospheric nitrogen is considered to be a proposition requiring careful consideration), and, thirdly, that it is doubtful whether sufficient soda to meet all Indian requirements can be obtained by the extraction of alkaline soils. The cost of the ammonia soda process would probably be too heavy to permit of soda manufactured by this process competing with imported carbonate in normal times. The electrolytic production of caustic soda and soda ash could only be made a success by utilising the by-products, and Magadi soda is likely to be a dangerous competitor with the Indian manufactured article; but, nevertheless, alkalis are so important that it may be necessary to protect their manufacture. It is considered essential to manufacture chlorine and bleaching powder in India.

As to the manufacture of explosives, synthetic dyes, drugs etc., from coal-tar, it is considered that the amounts of tar available in India at present are quite insufficient to start a large coal-tar industry, and that the only way to start such an industry would be to coke all suitable coal at the pit-head.

The manufacture of permanganates, chromates and lead products, such as litharge, red lead, and white lead, are all considered to be eminently practical propositions.

Wood distillation is regarded as rather a doubtful proposition owing to the existence of large supplies of its products and the low prices likely to prevail for some time after the war.

The Indian Munitions Board held a conference of chemists in 1918 and organized as far as possible chemical research work on industrial problems. Their list of chemical researches which have been taken up includes very little under the head of heavy chemicals; it includes a good many researches on Indian oils, such as *neem, mahva, til,* fish oils, the hardening of oils, the manufacture of glycerine and varnishes, the utilisation of new Indian tanning materials and preparation of tanning extracts; the preparation and refining of essential oils, such as rose, patchouli, retivert, lemon-grass, clove, cardamom; the manufacture of strychnine, atropine and caffeine, the manufacture of chromates, wood-distillation, and various problems which are not touched on in the chemical industries article in the Handbook, such as the manufacture of starch, alcohol and glue.

The Chemical Services Committee (1919-20) have expressed the opinion that India is deficient at present in raw materials for the production of organic chemicals from coal, but consider that there is an enormous field for the production of carbon compounds from vegetable products. They explain that they do not only refer to such products as oils from oil-seeds, indigenous dyes, drugs and essential oils, but consider that there is a great field for the production of new products of greater economic value by the conversion of organic compounds present in Indian plants.

India's Key Industries

From these references to what has already been said on the subject it is obvious that the subject can be looked at from several points of view. In the first place, it may be argued that, as India is essentially an agricultural country, exporting large quantities of agricultural products, the most obvious industrial development is to carry out in this country the processes to which those products are at present submitted on arrival at their destination. This argument recommends the pressing of oil seeds, the manufacture of soap, glycerine and varnishes, the tanning of hides and skins, the extraction of alkaloids and so on. In the second place, it may be argued that industries are bound to develop in all countries according to a definite sequence; iron and steel first, then machinery, then the textile and similar industries, and then the chemical industries to meet the requirements of these. In the third place, the great war has brought into prominence the disadvantage at which a country may be placed unless it is self-supporting as regards essentials, such as food and clothing and munitions of war. From this point of view it may be necessary for the State to protect and foster certain key industries.

At first sight it appears as though these different arguments might lead to different recommendations as to the chemical industries which should first be developed in India. If this is the case, it is obvious that there is something wrong with one or other of these general principles. But when carried to a conclusion all the arguments lead to the same recommendations. My own employment during the war, when I had the pleasure of helping in the British manufacture of synthetic dyes, naturally makes me inclined to look on the

problem of Indian industrial development from the last point of view, viz., to see that key industries are placed on a satisfactory footing. Fortunately India is essentially self-contained as regards food-stuffs and textile fibres; but she is by no means self-contained as regards military requirements, such as explosives and synthetic dyes. This points to the desirability of establishing the coal-tar industry in this country; for it is from coal-tar that all countries obtain their high-explosives, their synthetic drugs and their synthetic dyes. The war has taught us how intimately inter-connected are the manufacture of these three groups of chemical products. I find, however, that most chemists who have given their attention to the development of Indian industries discourage the idea of attempting the manufacture of explosives, drugs and dyes from coal-tar. They say that India does not produce sufficient tar; the tar is deficient in the most valuable ingredients; it is doubtful whether England will succeed in manufacturing these products in the face of German competition, and so it would obviously be absurd for India to try.

Explosives

Let us take first the most obvious military necessity, viz., explosives. What quantity of explosives does India consume? What quantity is she likely to require in the event of war? How much does she manufacture at present and how much does she import? I have not got any official returns as to production and consumption, but I calculate that India is producing less (probably far less) than 4,000 tons of explosives annually and importing less (probably far less) than 5,000 tons. I have arrived at the figure for India's production of explosives from the total consumption of nitrates and nitric acid in the country. The majority of the nitrates are no doubt used as manures, so that my figure is the maximum possible, which is probably many times greater than the actual. And for India's imports of explosives I have had to go by the figures for imports of explosives as private merchandise *plus* total Government imports of arms, ammunitions and military stores, excluding firearms. Here, again, my figure is the outside limit which is probably far greater than the actual figure. But these figures are no higher than the most moderate estimate of India's probable requirements in the case of war. Before the war England produced 18,000 tons of explosives annually. By 1916 the amount had risen to 200,000 tons and by the end of the war to about 350,000 tons. As we are on the subject of coal-tar, let us consider first those explosives which are manufactured from coal-tar, *i.e.*, high explosives, such as picric acid and T.N.T. Ammonium nitrate is also very important and can also be manufactured in connexion with the coal-distillation industry. During the war England produced about 1,500 tons of picric acid and T.N.T. a week, as compared with 2,500 tons of propellants, such as cordite, and 3,000 tons of ammonium nitrate. As a most modest estimate, we may assume that India should be able to produce 4,000 tons of picric acid and T.N.T. per annum and might require many times this amount.

Coal Tar Products

At present India makes about 500,000 tons of coke and 8,000 tons of tar per annum. It is estimated that, if all the coke were manufactured in by-product recovering plants, about 16,000 tons of tar would become available. This is a low figure, based on a note prepared by Mr. W. J. Alcock for the Indian Munitions Board. I think it is probably based on practice in the Bengal Iron & Steel Co.'s coking plant. It is well known that the yield of tar depends very much on conditions of coking, so that too much importance should not be attached to the low yield. But as the benzene and toluene content of tar is only about 1 per cent., we could not get more than 80 tons of benzene and toluene a year if all the tar at present produced were distilled for this purpose. The amounts of tar available in India under present conditions are obviously quite insufficient to produce all the explosives required. But Drs. Sudborough and Simonsen estimate that, if scrubbing plant for recovering benzene and toluene from the coke-oven gases were introduced, an additional 2,000,000 galls., or about 10,000 tons, of crude benzol could be obtained. With this quantity of crude benzol available the manufacture of high explosives becomes a practical proposition. Drs. Sudborough and Simonsen's estimate of 10,000 tons of crude benzol from plant producing 500,000 tons of coke is high, but, even during the war, the yield of crude benzol has been much increased by improved washing. According to the Proceedings of the Institute of Civil Engineers for March, 1918, 13·5 lb. of benzene and toluene can be obtained from 1 ton of coal. Calculating from this figure, plant producing 500,000 tons of coke could yield 9 million lb., or about 1 million galls. of benzene and toluene. This quantity of benzene and toluene would suffice to produce the quantity of explosive which we calculated as India's minimum safe production. In peace these hydrocarbons could be utilised largely for the production of dyestuffs. The Germans showed during the war the close connexion between the manufacture of explosives and synthetic dyes and drugs. Plant used in peace time for manufacturing dyes can readily be turned in war time to the production of explosives. Germany's large dye manufacturing concerns were so employed during the war. India's maximum annual importation of dyestuffs was 8,000 tons. This is a figure of about the same order as her requirements in the way of explosives and her present productive capacity in the way of benzene and toluene from her coking operations. Her production of iron and steel is bound to increase. Her coal resources have not yet been fully exploited and she already produces 20 million tons per annum. The amount of iron ore and other requisites for iron and steel manufacture are unlimited. India produces at present about 250,000 tons of iron and steel and imports 1¼ million tons annually. If she produced only as much as she now requires the blast furnaces would consume at least 1½ million tons of coke, and this would at once triple the possible production of benzene and toluene.

My calculations may be wrong, but, so far as benzene and toluene are concerned, I think India is in a sound position to undertake the manufacture of explosives, synthetic dyes and drugs.

Nor is India by any means dependent on her coking ovens for a sufficient supply of aromatic hydrocarbons to manufacture all the explosives and synthetic dyes she may need. During the war a good deal of attention was given to the production of these hydrocarbons from petroleum, and it is now recognised that this is a practical proposition. Ordinary scientific literature contains very little information on the subject. But in 1907 Jones and Wootton pointed out in the Chemical Society's Transactions that Borneo petroleum contains a considerable quantity of aromatic hydrocarbons, and we learn from a paper* in the Journal of the Society of Chemical Industry that a source of supply of toluene for British explosives was developed during the war by the Asiatic Petroleum Company from Borneo spirit. The third volume of the Society of Chemical Industry's Annual Reports informs us that in Russia aromatic hydrocarbons for dyes and explosives have long been obtained by cracking petroleum oils. Nikiforoff took out patents on this subject in 1886, 1887, 1901 and 1902. In the United States of America, also, a great deal of attention was paid during the war to the production of aromatic hydrocarbons by cracking petroleum.

Mention has already been made of the Chemical Services Committee's suggestion that some of the numerous organic compounds produced so freely in the vegetable world in India could be subjected to a variety of chemical processes to yield a range of chemical products. Explosives and dyes might be produced in this way, *e.g.*, tannins are produced in India in enormous quantities in barks, fruits, &c. Ordinary tannin or tannic acid is converted quantitatively into gallic acid on hydrolysis. Gallic acid is said to be converted quantitatively into salicylic acid or benzoic acid by reduction with zinc dust and ammonia.† These substances might serve as starting-out materials for the preparation of explosives, dyes, &c. I do not wish to be more explicit at present, but I may say that experiments I have in hand have already shown that aromatic hydrocarbons, ample for India's requirements in the way of explosives, dyes and drugs, can be obtained conveniently and cheaply from indigenous materials other than coal distillation by-products. I hope shortly to patent these methods of production and get them taken up on a large scale. Private firms of explosive manufacturers have already been considering the manufacture of high explosives in India.

It may, however, be argued that the successful manufacture of explosives, synthetic dyes and drugs requires not only a sufficient supply of cheap aromatic hydrocarbons but many

* J. S. C. I., 1919. 366 R.

† Guignet. Bulletin de la Société Chimique. (3) 7,153.

other chemicals in considerable quantity, such as sulphuric acid, nitric acid, caustic soda, alcohol, wood spirit, formaldehyde, chlorine, nitrite, zinc, ammonia, &c., and that the want of these renders impracticable any proposition for manufacturing dyes and explosives in India. Let us consider these chemicals in detail.

Sulphuric Acid

The manufacture of this acid has up to the present been seriously handicapped by the absence of suitable sulphides for roasting, and imported sulphuric has been used. India's present consumption of sulphuric acid is somewhere between 10 and 40 thousand tons per annum.

Owing to the importance both of sulphuric acid and zinc "the Government of India is interesting itself in the proposal to erect zinc-smelting works at Jamshedpur, where the zinc concentrates from Bawdwin in Burma will be dealt with and the spelter and sulphuric acid yielded made available to the Tata Iron & Steel Co. for their own purposes and for subsidiary companies. The plant, which it is proposed to erect with a loan from Government, will be capable of dealing with 25,000 tons of zinc concentrates, and the estimated output is 10,000 tons of spelter per annum" * and 32,000 tons of sulphuric acid. The iron and steel industry requires large quantities of sulphuric acid for recovering ammonia from the coking plant and for pickling iron plate for galvanising and tinning. Most countries consume very large quantities in the manufacture of superphosphates. There is no reason to fear that the production of sulphuric acid will exceed the demand, but it should meet all requirements for some time, including requirements for the manufacture of explosives and dyes. I have no information as to the amount of zinc concentrate which may eventually become available. At present this scheme has a serious defect from the military point of view, as a blockade of the Bay of Bengal would cut off the supplies of zinc concentrates. A railway from Burma to India is in contemplation, but I do not know whether it is likely to be built immediately. It seems remarkable that it should be necessary to go over seas, even as far as Burma, for sufficient suitable sulphur compounds for the manufacture of sulphuric acid. During the war the German Government is said to have subsidised heavily an enterprise for the manufacture of sulphuric acid from gypsum,† and it is stated that sulphuric acid can be manufactured in any quantity by this process at the same cost as from imported pyrites. On consideration, it seems almost certain that in any country the bulk of the element sulphur will be in the form of sulphates. Sulphides are essentially unstable compounds and on weathering are converted with sulphates. It is certain that there are sufficient natural sulphates in India to supply all the sulphuric acid likely to be required either now or in the future. I hope shortly to take out patents for the manufacture of sulphuric acid from readily available natural sulphates.

Nitric Acid

At present India exports about 26,000 tons of nitre, consumes about 4,000 tons and imports about 1,700 tons of Chili saltpetre. Her imports of nitric acid are negligible. With a sufficient supply of sulphuric acid there will be no difficulty about producing the nitric acid required for explosives and dyes.

Caustic Soda

The quantity of alkalis required for the manufacture of dyes and explosives is comparatively small, and India's requirements in this respect could easily be met from the salts contained in alkaline soils. Drs. Sudborough and Simonsen's remarks on the question of alkali manufacture have already been quoted at some length. That it is a key industry there can be no question. The present consumption of alkalis is comparatively small (35,000 tons of soda imported in 1917-18), but increased production of cotton goods and soap is bound to multiply many times the present demand for alkalis. An increased demand for cotton goods is one of the most certain results of India's development, and, with an increase in the production of iron and steel and machinery, there is no doubt that increasing quantities of cotton goods will be manufactured in this country. The present value of cotton goods consumed per head of the population is Rs. 2-12 per annum. There can be no doubt that this will be multiplied several times in the near future and that the bulk of the goods will be manufactured in this country. This will increase proportionately the demand for alkalis, which are used for scouring cotton goods.

It is doubtful whether it will be feasible to get all the alkalis required from alkaline soils. Mr. Srivastava, Industrial Chemist to the United Provinces Government, estimated that 5,000 tons of soda ash per annum could easily be obtained from *reh* soils near Cawnpore. There are large tracts of such soils in the United Provinces and the Punjab, and there would be no difficulty in manufacturing all India's alkali requirements from these soils if Mr. Srivastava's estimate is correct. On the other hand, I hear that a recent survey by the Geological Department of the alkaline earths of Rajputana gave disappointing results, although these soils have generally been considered a more suitable source of soda than the soils of the United Provinces and the Punjab. Some more quantitative information about the alkaline soils of the United Provinces and the Punjab is urgently required to decide the lines on which this key industry must develop.

Alcohol

As India is essentially an agricultural country and exports large quantities of material, such as grain, which are used in the country of destination for the production of alcohol, there seems no reason to doubt that industrial alcohol could successfully be produced in India. Dr. Fowler's selection of *mahua* flowers as the most suitable starting-out material has been criticised, but I have not time at present to discuss this point.

Wood Spirit, Formaldehyde and Acetic Acid

I have already mentioned that the writers of the article on chemical industries in the late Indian Munitions Board's Handbook look on wood distillation in India as a somewhat doubtful proposition, on the ground that very large plants for wood distillation were set up for war purposes and will flood the post-war market with wood spirit and acetic acid at low prices. But these products are all dangerous chemicals, and shipping freights on them are very high, so that a comparatively small plant meeting India's requirements would probably be a sound proposition, although manufacture on a large scale for export might not be feasible.

I hope I have said enough to show that we do not really arrive at different conclusions by approaching from different points of view the problem of the development of India's chemical industries. If we start with the idea that the first and most obvious thing to do is to work up our vegetable products to a certain extent before export, we find that to do this we want cheap acid, alkalis, spirit, &c. If we start with the idea that there is only one possible sequence of development of industries which has been followed in all countries which have developed, and must be followed in all countries which are developing, viz., iron and steel manufacture first, then machinery, then textiles, &c., with chemical industries as hand-maidens called in as required, we find again that cheap acids and alkalis are the first chemical requirements, and the manufacture of explosives, dyes and drugs necessarily follows for the utilisation of by-products and to meet the requirements of the textile industry. If we start with the idea that first and foremost we must see that India's military requirements are met so that she could withstand a blockade, then we decide that explosives must be manufactured in the country from materials all available in the country. This leads again to the necessity for developing the iron and steel industry, for the manufacture of acids and alkalis, the utilisation of coking bye-products and the manufacture of dyes and drugs along with the explosives.

I find that I have spoken chiefly about the development of chemical industries in India and very little about chemical research for the development of industries. But that seems to me the proper way of looking at the subject. First let us decide what has to be done, and then let us see how chemical research may assist. At first it may seem that there is not much need for research to instal in India such well-known industries as the manufacture of iron and steel, sulphuric acid, alkalis, coking bye-products, &c. But my discussion of these problems has already suggested several researches, *e.g.*, the question of the utilisation of sulphates for the manufacture of sulphuric acid, a survey of India's alkaline soils, and the possibility of finding other sources than coal-tar and coke-oven

* Cotton. Handbook of Commercial Information for India, p. 234.
† J.S.C.I. 1916, 1058 U.S. Pat. 1197, 331 of Sept. 5, 1916.

by-products for the manufacture of aromatic compounds, such as explosives, dyes and drugs. These are researches for the decision of most important and fundamental questions. The establishment of any manufacture involving chemical reactions on a large scale is much assisted by chemical research.

Problems are certain to arise from the fact that the materials available, or climatic conditions or other factors, are different from those in the countries already carrying on these manufactures. These are platitudes which the British find it hard to recognise, but which are, nevertheless, recognised to a greater extent than before the war. So far I have spoken of research in connexion with the fundamental industries. For others which are not, perhaps, of such vital importance, there are any number of chemical problems appealing, perhaps, more strongly to the chemist, whose interests are primarily scientific *e.g.*, lac-dye is thrown away at the present time. Apparently the fastness to alkalies of its dyeings is not quite good enough to meet modern requirements, but it is an anthraquinone derivative, and so belongs to the same family as our most valuable mordant and vat dyes. Comparatively simple chemical treatment might convert it into a valuable dye. In Indian turpentine we have a cheap source of pinene in any quantity. The chemical relationship between the different members of the terpene group is very close, and it seems quite feasible to convert pinene into the unsaturated open chain compounds which are the chief constituents of essential oils and perfumes. Amongst the vegetable products of India the organic chemist can find any number of problems of interest, and very likely of profit.

Glycerine and Its Many Uses

Substitutes in Germany

THERE are few substances known to commerce which have a wider range of usefulness than glycerine, and this is the more remarkable in view of the fact that until a comparatively recent date it was regarded as a useless waste product of the soap industry, and was allowed to run to waste in the "sweet waters" or lyes. During the war it occupied a very prominent position among the raw materials required for munitions, as it is the chief constituent of nitro-glycerine. It is present to the extent of about 10 per cent. in most oils and fats, and in the process of soap-manufacture it is recovered as a valuable by-product by means of the operation known as "fat-splitting" or saponification. In some soaps, however, *e.g.*, some kinds of toilet soaps, and in glycerine or transparent soaps, the glycerine is retained.

Among its numerous uses in modern industry are the following: In the manufacture of drugs and pharmaceuticals, especially in combination with boric acid and phosphates, as a substitute for sugar in the treatment of diabetes, and it is a valuable constituent in many ointments, face creams and other toilet preparations; in the manufacture and preservation of foods, as it is a valuable disinfectant and preventive of fermentation, and is largely used as an addition to wines and beer; in the preparation of tobacco to prevent dryness; in the paper industry, particularly in the manufacture of parchment; in the textile and leather industries; in the manufacture of copying inks, stencil inks, printing rollers, hectographs, &c.; in photography, modelling, sculpture; in the preparation of non-freezing mixtures—*e.g.*, for gas meters—and for innumerable other purposes. So long ago as 1873 a German firm in Brunswick issued a circular enumerating more than sixty different uses for glycerine; and more recently a large firm of soap-makers have published a pamphlet in which this number of uses is more than doubled.

Under the stress of war-time conditions, especially in Germany, where oils and fats, and therefore glycerine, became extremely scarce, numerous attempts were made to find substitutes and also to obtain glycerine either by chemical synthesis or by fermentation of sugar. A process for manufacturing glycerine from sugar was also evolved in the U.S.A. a few years ago, and in Germany it was carried out on a fairly large scale by the Protol Company, large works being erected for the purpose. At present the need for this new "protol" glycerine and for all the numerous substitutes introduced is not nearly so acute; indeed, there is almost a slump in real glycerine at the moment, and many of the works are on short time. But the really interesting point about these substitutes and the new fermentation process is that, however unnecessary it may appear at present, they can exercise a certain salutary effect in preventing the prices of glycerine rising too high. Moreover, although no one single substance can take the place of glycerine in all its manifold applications, there are substitutes which, for certain specific uses, may be actually superior to and cheaper than glycerine itself for those particular purposes. The following are the principal substitutes introduced in Germany:—

Dextrose glycerine substitute manufactured from beet sugar. The sugar is boiled with dilute hydrochloric or sulphuric acid, thus forming an "invert" sugar, and this is then neutralised and magnesium chloride is added.

Erythrit.—This is found in various kinds of seaweed and lichen in the form of erythrin, which is an ester or salt of ersellinic acid. It is separated by the process of saponification, and, in solution, forms a very sweet viscous preparation.

Glyzerit.—This was originally made by a Swiss firm in Zurich, and contains a certain amount of real glycerine. Analysis of a sample showed it contained 10 parts of genuine glycerine in 8 parts of water, and 5 parts of a gummy substance or mucilage.

Glycerinova.—It is claimed that this forms an excellent substitute for glycerine in the manufacture of cosmetics. It consists chiefly of calcium chloride, potassium lactate and a vegetable gum, and is manufactured by Merz & Co., of Frankfort-on-Main.

Glycinal.—This was widely advertised in Germany and was manufactured by one of the great dye firms, Leopold Cassella & Co., of Frankfort a/M., a member of the famous cartel. It is not easy to give its exact chemical composition, but it appears to be a complex mixture of potassium chloride with a pyridin compound (beta-dipyridin). It is a colourless, tasteless and viscous liquid, is soluble in most of the ordinary solvents, and is recommended for use in the manufacture of various pharmaceutical preparations, ointments, tooth-pastes, &c.

Glyceryl.—This is also obtained from sugar, or rather molasses, which are acidified with phosphoric acid and subsequently treated with charcoal and zinc acetate. It is specially recommended in the preparation of cosmetics.

Kipp's Glycerine Substitute.—This forms the subject of Swiss patent No. 71,922, and consists of an aqueous solution of quince seed, sugar being added, and also a preservative such as boric acid. It is used in toilet soaps and cosmetics.

Limpellin.—This substance, which is put on the market by the well-known firm of Henkel & Co., consists merely of a vegetable glue with the addition of boric acid.

Magnesium butyrate.—This forms the subject of German Patent No. 311,374, by the Chem. Fab. Flörsheim (Dr. H. Nördlinger), and consists either entirely of magnesium butyrate, or with the addition of alcohol, glycerine, magnesium chloride or other substances. It is claimed to be one of the most widely applicable among glycerine substitutes.

Mollphorus.—This is yet another sugar preparation, and contains both raw sugar and "invert" sugar.

Novoglycerin.—Merely a solution of glye.

Perglycerin and Perkaglycerin.—These are sodium lactate and potassium lactate respectively, and were widely advertised. Patents have been taken out by the Chem.-Fab. Goldenberg & Co., of Winkel-on-Rhine.

Pentaerythrit.—The important claim is made for this that it can replace glycerine in the manufacture of explosives. It is prepared by the action of lime on formaldehyde and acetaldehyde, but the process is very slow and requires at least a week to complete.

Tego-glycol or Glycol.—The glycols are really a group of organic chemical compounds closely related to glycerine, and the one specifically referred to here as a glycerine substitute is ethylene glycol, but is generally known merely as glycol. It is manufactured by a special process by Th. Goldschmidt Akt.-Ges., of Essen, and a wide range of usefulness is claimed for it.

Textose.—This is said to replace glycerine as a dressing for textiles. It is made by Stadler Brüder, near Prague, from molasses.

Other substitutes include betain (Ger. Pat. 328,530), ester salts of phthalic acid, thiocyanogen salt solutions (Ger. Pat. 299,288), various gummy or mucilaginous mixtures containing agar-agar, mosses, gelatine, isinglass and algin (from seaweed), and preparations under the trade names of Neoglycerin, Nuvestin, etc., of which no particulars are available.

The Leather Trade as a Chemical Industry

By A. Harvey

ALTHOUGH the conversion of hides and skins into leather is one of the oldest of industries, it is only within comparatively recent times that it has reached the status of a chemical industry. This wonderful progress which has been made in the science of leather production is due to the labours of such chemists as Professor Procter, Dr. Parker, Mr. Bennett and their co-workers in London and Leeds. A further impetus was given by the formation in the nineties of the International Association of Leather Trades Chemists, which since the war has been reformed among allied and neutral countries into the Society of Leather Trades' Chemists, and those interested need only take a glance at the pages of the journals published by these bodies to become aware of the enormous amount of research work which has already been done in the domain of leather chemistry. Further, the biological side of leather manufacture must not be lost sight of, and the practical application of the researches of such men as Wood and Seymour-Jones are still fresh in the mind of the trade.

Raw Materials

A study of the raw materials used in the leather trade will show that the chemist who specialises in this branch of technology must have a fairly comprehensive knowledge of analytical work, as he has to deal with a large number of both inorganic and organic substances.

One of the main substances used, *i.e.*, tanning materials, presented great difficulties in analysis, and this for many reasons. The actual tannin cannot be isolated quantitatively from the material, and also all tannins are not identical in character or composition. The hide powder "shake" method, now so widely used by trade chemists, has been adopted as the result of the work of a number of chemists, and, although imperfect in many respects, is the best and most reliable that we have at our disposal. Whatever the defects of this method of analysis, its introduction did one good thing, that is, it was one of the best means of placing the industry on a scientific basis. Tanners were able to have the composition of their tanning agents tested within a fair degree of accuracy.

While on the question of tanning materials, mention must be made of the introduction of tanning "extracts." These extracts are manufactured by leaching the raw tanstuff under special conditions, and concentrating the liquor down to either a thick treacly consistency, or to a solid mass. Such extracts have many advantages over the crude material. Thus a soluble material is available to the tanner, strong liquors are more readily prepared, and there is a considerable saving on freight charges. Further, such prepared extracts are, for any particular make, uniform in composition, the importance of which point cannot be overlooked. The introduction of tanning extracts can certainly be attributed to the application of science to the industry, and represents an advancement of the highest commercial importance. In passing, it is of interest to note the difficulty which was encountered in impressing upon the older tanner the advantages of these materials, and one of the largest tanning-material merchants in the City once told the writer that he was almost afraid to offer the stuff for sale, so conservative was the tanner of those days, and it was only after repeated trials that any impression was created—a contrast from to-day, when the tanner is only too glad to t any new improvement in either a process or material.

Bateing Material, &c.

One of the processes incidental to the manufacture of many classes of leather is that known as bateing or puering, which entailed the use of offensive material. For a long time the mechanism of the process was not understood, but finally Wood, of Nottingham, and a few Continental scientists investigated the process on scientific lines.

The result was that the biological character of the process was established, and attempts made to prepare artificial "bates." It might be mentioned also that the significance of amino compounds, &c., was also pointed out in these researches. One of the first preparations put on the market was "Erodin," of German manufacture, but this has since been followed by such effective articles as "Pancreol" and "Enzo," of British make. Here, again, the tanner is deeply indebted to science for giving him a uniform, clean and effective substitute for most repugnant material.

Mineral Tannages

The application of chemistry has also made itself felt in the realm of mineral tanning, and more particularly in chrome tanning, a process which has developed wonderfully during the past ten years or so. With the increased popularity of chrome leathers there has been a big demand for ready-made single-bath chrome liquors, a subject which has been taken up very seriously by chemical manufacturers.

One of the very early chrome liquors was that introduced by Procter, consisting of a basic chrome sulphate, made by reducing a mixture of a bichromate and a mineral acid with glucose. This latter has since become an expensive chemical and has been substituted by sawdust (Blanc's patent), spent tan, &c. (Blockey-Walker patent), and sulphur di-oxide (Balderston). By whatever method these liquors are prepared, it is an essential point that the so-called basicity (*i.e.*, ratio of the Cr to SO_4) be kept uniform, and this can only be done by observing strict uniformity in manufacture and control by the chemist. Then from the chrome leathers we have the semi-chrome leathers, that is, leather which has been partly tanned with vegetable materials and partly with chrome. In this sphere one mentions the work of Lamb who has given much attention to the subject. Semi-chrome leather has many features, and many properties of both vegetable and chrome leathers are combined in the one article. In addition, by the semi-chrome process a very good class of leather can be produced from a material which would otherwise give a very poor article. Finally, in the mineral tannages one can mention the strides which are now being made in the production of leather by means of iron salts. American chemists are working very hard on this practically untouched subject, and some interesting results are forthcoming. Incidentally, the subject has been recently reviewed by the well-known Continental chemist Jettmar (Die Eisengerbung).

Synthetic Tannins

In many departments of the leather trade it has been the object of the chemist to introduce artificial substances, and in this connexion the tannins have received their full share. Synthetic tannins are now well established in the trade, and there is certainly a great future before them. Credit must be given the Austrian chemist, Stianny, for the preparation of the first synthetic tannin, Neradol D., and since that time the subject has been pursued vigorously both in England and abroad, and such materials as "Maxyntan," "Syntan," "Paradol," &c., are practically household words in the trade. These substances are phenolic condensation products, and although not having the same chemical structure as tannin, do possess the important property of converting hide into leather. Thus a class of materials comparatively unknown ten years ago has now been made the subject of a 150-page monograph by Grasser (Synthetische Gerbstoffe).

Colloidal Tanning

The hastening of the tanning process by means of colloidal assistants represents a very important commercial improvement, inasmuch as time is saved, tanning materials can be more economically used, and a better weight of leather produced, this latter being of prime consideration in the case of sole leather, where the finished article is sold by weight. In the presence of colloid materials as "Tragasol" and starch jelly (Turnbull's patent), the astringent action of strong tannin solution is restrained, and hence tanning can be done in practically neat tanning extracts. This invention is largely the outcome of the combined efforts of Cross, Greenwood and Lamb, although the use of starch was suggested by Turnbull.

The above notes give briefly a summary of the more important advances which have lately been witnessed in the leather trade, but it is by no means complete, as such process as the vacuum tanning process of Nance has not been mentioned, or the introduction of nitrocellulose varnishes in the production of enamelled splits and patent leathers. It has been the aim of the writer in mentioning the various new introductions to impress the reader with the fact that the application of chemistry and allied sciences to the leather trade has met with unbounded success, and one is quite safe in assuming that even greater inventions are anticipated.

The Fine Chemical Industry

Manufacture of Ethyl Compounds

IN the course of his speech at the twenty-fourth annual meeting of the shareholders of W. J. Bush & Co., Ltd., held on August 18, at the Institute of Chartered Accountants, Moorgate Place, E.C., Mr. James M. Bush (chairman and managing director) referred to the fact that at this time last year British chemical industry was undergoing a period of exceptional trade activity. In the interval, he said, we had passed through what was, perhaps, the most severe depression in trade in the experience of living men—a condition of things, which, unfortunately, still continued. Although this change was not altogether unforeseen by the board, it came with such suddenness, and the depreciation in the value of commodities had been so great, that, in common with most industrial concerns throughout the country, the company had had to face considerable losses through depreciation in the value of stocks. The most noteworthy feature in the accounts was the big increase in expenses; the cost of nearly all materials and services was greatly enhanced. It was a manifestation of the altered sense of the value of money brought about by the huge war expenditure, but he hoped that the process of retrenchment through which we were now passing, would soon restore the industrial prosperity of the country.

Continuing, Mr. Bush said, shareholders had been informed from time to time that the policy of the board was one of expansion, and, both during the war period and since, they had done their utmost to help to build up the fine chemical industry in this country, the war having shown how necessary it was to have such an industry in the interests of national defence. At the present time, owing to low labour costs in Germany and the low cost of raw materials produced within that country, they were unable to compete with German manufacturers in many chemicals where these advantages played an important part. Consequently, a large portion of the plant had been idle for some months, and many men who were trained at great trouble and expense had been put out of employment or on short time. The introduction of the "Safeguarding of Industries" Bill showed that the Government was alive to the situation and was making an endeavour to save this infant industry during the present abnormal conditions; but all manufacturing chemists realised the temporary nature of the expedient, and that the survival of the industry in the long run depended upon efficiency. In many cases which the company had carefully investigated, their inability to compete had been found to be due to the causes mentioned, and not to lack of efficiency or skill on the part of chemists.

Referring to the difficulties of the essence industry, Mr. Bush said that since the last meeting the Government had removed one handicap by allowing certain ethyl compounds to be manufactured from duty-free spirit. In this respect, therefore, English manufacturers were now on terms of equality with their foreign competitors. There were, however, other burdens which the industry had to bear which he hoped the Government would alleviate before it was too late.

Their foreign branches and subsidiary companies had suffered from the world-wide stagnation in trade, but remained in financially sound condition. The Russian branch, of course, could no longer be considered to be in existence.

Kidderminster Chemical Workers' Outing

THE annual excursion of the employees of B. Hepworth & Co., Ltd., chemical manufacturers, of Kidderminster, took place on August 13, when Bridgnorth was visited. Messrs. A. Cotton (chairman), E. G. Eddy, M.B.E. (managing director), H. W. Gethin, J. Harvey and H. E. Purkis (directors) accompanied the party.

After a lunch at the Crown Hotel, Bridgnorth, Mr. Cotton, replying to the toast of the firm, said that last year they had presented three watches to work-people for long service to the firm, and this year Mr. H. Arkwell, with 23 years' service, had been presented with one.

Replying to the toast of "the managing director," Mr. Eddy said the company had never had a more loyal and hard-working body of men and whatever success the firm had achieved was due to their whole-hearted co-operation. The only cure to-day for industrial unrest was the old "intimate touch" between master and men, and they had that on their firm. He should continue to put increased production as the main basis of success. It was a pernicious doctrine, preached by some, that by retarding production employment was assisted; it was a doctrine which had brought about much unemployment in this country. Unemployment was also caused by endeavouring to get from an industry that which it could not pay, as evidenced by the large firm of ship-builders giving notice of closing down owing to their being unable to make profits. Their wage bill was seven times what it was in 1914.

It was no use adopting up-to-date methods if co-operation was lacking, for what benefited the company also benefited the employees. He thanked every individual worker for their services, especially Mr. Edwin Price, who had been a most loyal employee for nearly forty years.

After trips on the river, tea was served at the Crown Hotel and the party returned to Kidderminster.

Safety First

Precautions Against Dust Explosions

AMONG the numerous risks and hazards which the "safety-first" engineer has to provide for, that of dust explosion must take a prominent place, for this type of accident has become rather unpleasantly common of late years, not only in grain elevators and flour mills—where one naturallly expects something of the sort—but also in factories concerned with the manufacture of such things as aluminium ware, chocolate, starch, and many others. Dust explosions are often due to the neglect of the most obvious and simple precautions—mere cleanliness, for example; but in other cases additional risk is introduced, such as the use of carbon bisulphide as an insecticide in grain elevators and warehouses. This gas is much heavier than air, and therefore does not mix readily with still air, but accumulates on the floor and at the bottom of bins, and it is inflammable at a very low temperature. Its use, therefore, in places where dust may accumulate must be very carefully supervised, and one of the first essentials is proper ventilation and circulation of the air.

It is clear that the prevention of dust explosions involves two things. First, the absence of dust clouds; and, second, the elimination of all sources of ignition, particularly those due to foreign matter in grinding machines, overheated bearings and imperfect insulation. To prevent the formation of dust clouds, every machine or apparatus where dust is produced must be provided with an exhaust with powerful suction. This is obviously most essential not only to prevent explosions, but for other important reasons besides. But the most efficient suction devices do not entirely prevent the accumulation of dust on beams and rafters and elsewhere, and the risk of such accumulations being suddenly dispersed into the atmosphere, and it is therefore necessary that those parts of the factory where dust may accumulate should be thoroughly cleansed at frequent intervals, preferably by means of vacuum cleaners. It is hardly necessary to add that proper ventilation is an important safeguard against dust explosions, particularly in cases where inflammable gas vapours may be present

To remove all sources of ignition it is essential strictly to prohibit all naked lights, and the accidental production of sparks, *e.g.*, in the grinding machinery, necessitates the most careful removal of all foreign matter from the material to be ground, chiefly by means of screening and magnetic separation. Overheating of any part of the machinery must be avoided, also the production of static electricity, especially in the vicinity of belts. This latter may be prevented by installing collector combs made from bronze wire screening by removing a few of the cross wires and leaving a series of projecting points. These combs are fastened under the belt, as close to it as possible, and earthed. Incandescent electric lamps should be enclosed in vapour-proof globes, and fuses and switches and dynamos, &c., must be rigorously protected from dust.

All these things are obvious enough, but no one knows better than the "safety-first" man how quickly they are forgotten, and, human nature being what it is, constant warning and repetition in every possible way—the more varied the better—are indispensable.

Chemical Resources of Our Colonies

Some Local Industrial Developments and Trade Possibilities Outlined

WITH the need for a great increase in overseas trade so clamant, United Kingdom manufacturers and traders are sometimes inclined to overlook the fact that they have almost unlimited possibilities for trading with the British Dominions. The Colonies are anxious to take our goods in preference to those of other nations, but we must see to it that our goods are of the best quality and our trading methods kept above reproach, or we shall ultimately find the Colonies reluctantly compelled to place their orders elsewhere. Speaking at Darlington last week, Mr. Massey, Premier of New Zealand, said he did not think we had done nearly as much as we ought to have done in regard to Imperial preference. They in the Dominions already gave British goods preference, and he hoped they would be able to do more in that direction in the next few months.

Two main directions in which the universities of this country could assist in the research work essential to the conservation and development of the Colonies and Protectorates are recommended by the Committee presided over by Lord Chalmers, which issued its report on Tuesday. Throughout their inquiry they have been struck not only by the readiness but by the anxiety of the universities of the United Kingdom to assist by every means in their power the development of the Empire by scientific research. They have found all alike impressed by the essential importance of research and fully prepared to employ their resources not only in training students but also in conducting researches. Although it had been suggested that a separate and distinct Colonial Research Service should be instituted for the purpose of conducting researches of interest to the Colonies, and that special inducements should be offered in order to obtain recruits for it, the Committee unhesitatingly reject this suggestion. Apart altogether from the fact that such a service would require independent laboratories and the creation of an entirely new organisation, they are clear that Colonial needs are, and must always be, inseparably dependent upon science in its broadest aspect and in its widest outlook. The two main directions in which assistance can be given are : (1) In a fuller training of students, from whom would be drawn recruits for Colonial scientific departments ; and (2) in the building up of a corps of advanced workers, whose services could be utilised in emergencies and in exploring and solving the more complex problems.

The following notes describe some of the recent developments and prospects of chemical and allied industries in the British Dominions :—

Australia

New Chemical Enterprises

Among the Australian industries which came into existence largely as a result of the war is Sulphates Proprietary, Ltd., a company formed to take over the manufacturing business formerly carried on by The Australian Alumina Co. Pty., Ltd. The company is at present manufacturing sulphate of alumina and alum on a fairly extensive scale, and is about to make further additions to its plant to enable it to meet the growing demand for the commodity. After three years of research and experimental work, operations on a small scale were commenced in January, 1919, when a plant was erected at Collingwood, Victoria, by Messrs. N. G. Roper & M. J. Martin. Here manufacturing processes were evolved and sulphate of alumina produced to fulfil orders from local manufacturers, who were then short of the material, which could only be purchased abroad at about 50 per cent. more than the price charged for the local product.

The business was then formed into the Australian Alumina Co. Pty., Ltd., by whom manufacturing operations were carried on, and an investigation made of the various aluminous ore deposits throughout the Commonwealth. Extensive tests were made on aluminous ores, such as kaolin, alunite and bauxite, obtained from various parts of the Commonwealth. The physical nature of these ores varied considerably, but eventually the company acquired a property at Narracan, Gippsland, Victoria, where the bauxite deposits were found to be exceptionally suitable for the production of alum salts. The development of this deposit in itself is indeed a welcome addition to the enterprises engaged in the utilisation of the natural resources of Australia. The growing importance of the bauxite industry will be seen in the following comparison of the quantities of ore mined in the producing countries :—

PRODUCTION OF BAUXITE.

Country.	Tons. 1913	Tons. 1917
United States	216,241	568,690
France	304,314	not available
United Kingdom	8,282	14,724
Italy	6,841	7,666
India	1,184	1,363

The present world's production is estimated at approximately 900,000 tons a year, of which about 180,000 tons are used for the production of salts.

Recent Australian imports of sulphate of alumina are as follows : 1913, 164 tons ; 1916-17, 204 tons ; 1918, 375 tons ; 1919, 380 tons. During 1919 the Australian Alumina Co. Pty., Ltd., produced 60 tons of the material. Of the imports in 1919, 209 tons came from Japan and 170 tons from the United Kingdom.

The establishment of the industry, states the *Industrial Australian and Mining Standard*, has opened up a means of converting the Australian bauxite resources into commercial products of world-wide use and importance.

The world's annual consumption of aluminium salts is well over 300,000 tons, and is rapidly increasing. Large quantities are used in India and the East, also on the West Coast of America and South America. The development of the industry in Australia therefore should be followed by an export trade of considerable proportions. Another consideration is the fact that since sulphuric acid is largely used in sulphate production, the new industry will help to absorb some of the great Australian output of this acid forthcoming in large quantities from the local treatment of metallic ores.

An Important Dyestuffs Enterprise

Reference has already been made in THE CHEMICAL AGE to the new Australian dye-making firm, Australian Dyes Pty., Ltd., and it will be remembered that the company, after conducting numerous experiments was able to produce 23 different dyes. The company is at present producing light dyes on a commercial scale, but hope within the next few months to be able to produce every shade of dye required in Australia. The present production of one ton per week of any given dye, however, represents only a portion of Australia's requirements since, during the period July 1, 1920, to Feburary 28, 1921 dyes to the value of £350,000 were imported into the Commonwealth.

When working at full capacity the company will employ from 250 to 300 workers in addition to a large technical staff.

The Yacca Gum Industry

Wider Commercial Applications Expected

Before the war the collection and exportation of South Australian yacca gum was an important industry, states a writer in the *Industrial Australian*, but as Germany was the largest user of this product, the industry was suspended during the first years of the war, and production did not revive until 1916, when a use was found for yacca gum in the manufacture of explosives, both in England and the United States of America. In 1919 more than 10,000 tons were gathered, and as the Australian consumption is small the greater part of the output was shipped to Great Britain. Many industrial chemists believe that further experiments in the use of this valuable product will develop a larger scope for its utilisation, and thus ensure the expansion of the industry.

Before the war two-thirds of the Australian output was bought by German firms. Local dealers have never been able to discover to what use the Germans put it, but they believe that it was used in the manufacture of furniture polish and

lacquer for metal ware. Since, however, the product contains a high percentage of picric acid on nitration it is more probable that it was used by the Germans in the manufacture of explosives—a use to which it was put by the Allies in 1917.

The gum from the species *Xanthorrhoea Hastilis* is, of course, one of the oldest known sources of picric acid, yielding about 15 per cent. by treating the gum with strong nitric acid. The gum has been used in the manufacture of dyes, and is also of considerable importance in the manufacture of linoleum. Experiments have shown that yacca gum is soluble in alcohol, but insoluble in turpentine, linseed oil, benzine, molten paraffin, and hydrocarbon solvents generally. The gum is partially soluble in cold strong sulphuric acid to a deep red solution; on dilution of the sulphuric acid solution and cleaning, the brownish-red solid separates. When filtered and freed from sulphuric acid, this solid dissolves in water and is reprecipitated from its aqueous solution by the addition of a little sulphuric acid.

Australian Metal Production

The Australian Metal Exchange have prepared a statistical statement showing (1) the metal contents of the ores, &c., of lead, zinc, silver, copper, tin, and iron produced in Australia; (2) the recovery of refined or partially refined metal from these mine products locally treated, and the metallic contents of mine products exported for refining; and (3) the refined metal and the metal contents of the mine products exported from Australia. A copy of the statement may be seen by United Kingdom firms interested on application at the Enquiry Room of the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1.

Canada

Market for Laboratory Supplies

The demand for scientific apparatus for the teaching of chemistry, physics, &c., in the educational institutions of Nova Scotia is somewhat limited owing to the scarcity of high-grade schools, but the demand for laboratory supplies for such firms as the Dominion Tar & Chemical Co., Ltd., the Dominion Iron & Steel Co., and the Nova Scotia Steel & Coal Co., Ltd., is reported to be comparatively large and constant.

Scientific apparatus used in the public schools of Manitoba is largely of English manufacture, though some recently purchased from an American concern is, according to the U.S. Consul in Winnipeg, proving very satisfactory. From the same source we learn that for the year ended June 30, 1919, there were 121 public schools in the Province doing high-school and collegiate work. The enrolment in these schools for the same period was 14,303 pupils. Statistics for the year ended June 30, 1920, are not yet available, but the total enrolment is expected to show a decided increase. Each school board purchases its own apparatus. The school board at Winnipeg is the largest purchaser of such equipment in the Province.

The Manitoba Agricultural College, Winnipeg, has about 400 students. Scientific apparatus in use at this institution was purchased principally from German manufacturers, but there has been but a very small quantity purchased from any source within the past six years.

The University of Manitoba, which is affiliated with the Manitoba Medical College, also at Winnipeg, purchases scientific apparatus as needed from manufacturers direct; the last equipment bought was from American and English manufacturers. Much of it was formerly bought from Germany. Wesley College, a sectarian school, at Winnipeg, usually purchases all scientific apparatus from catalogues.

Statistics for the quantity and value of scientific apparatus and text-books imported for use in Manitoba are not available, as this information is combined with statistics for the Dominion. For the four months ended July 31, 1920, however, the total value of scientific and educational equipment for all purposes imported into Canada was $1,274,021. Of this amount the United States supplied goods to the value of $1,084,759, and the United Kingdom is credited with imports valued at $111,396

Production of Sodium Sulphate

An important chemical industry is being established at Vonda, Saskatchewan, where there are large beds of sodium sulphate from which Glauber and epsom salts are obtained by re-crystallising the crude material. The Salts and Potash Co., of Kitchener, Ontario, has a large plant recently completed in that city, and has under construction and approaching completion a refinery at Vonda for the treatment of sodium sulphate. Glauber's salts are obtained from the anhydrous form of sodium sulphate known as salt cake by dissolving and recrystallising it below 32°C. Hitherto the production of salt cake in Canada has been in the form of a by-product in the manufacture of muriatic acid. The Canadian production of salt cake in 1919 was 3,197 tons valued at $57,045, and of Glauber's salts 1,423 tons of the value of $45,731. The imports of these products during the same year were 47,905,004 lbs. of salt cake valued at $343,007; and 738,423 lbs. of Glauber's salts.

Pulp and Paper

Steady Expansion of the Canadian Industry

The year 1920 was in every way an extremely satisfactory one for the pulp and paper industry in Canada. The year was one of steady expansion. The gradual depletion which the world's stores of pulpwood are undergoing, and the continually increasing demands from the United States, Europe, and the East, have combined to make this industry a more important factor in the Dominion's industrial life, and the tangible results of the past year are only eclipsed by an indubitably bright outlook. According to *Agricultural and Industrial Progress in Canada*, the total exports of pulp and paper for 1920 were valued at $163,217,988, as compared with $96,376,664 for 1919. If to this were added pulpwood exports, the value of all three would be $178,906,159, as against $106,969,000 for the preceding year.

Exports of paper, the most important item in the year's manufacture, amounted in value to $86,744,010, as compared with $59,391,000 in 1919. Wood pulp, second in importance, was shipped to the extent of 16,399,897 cwt., valued at $76,383,978, as against 14,182,533 cwt., of a value of $50,796,660 in the previous year. Pulpwood exports amounted to 1,248,395 cords, valued at $15,778,171, compared with 1,060,275 cords, valued at $10,593,581, in 1919. Shipments of newsprint, which in the previous year totalled 14,192,556 cwt., valued at $50,796,661, reached 15,238,891 cwt., of a value of $72,920,223. Export demand for the higher grades of pulp and for newsprint paper exceeded the supply throughout the year.

Exports to the United Kingdom during 1920 were valued at $13,417,574, wood pulp at $8,543,119, and paper of all kinds at $4,874,455. In the preceding year the total exports were $8,522,738, divided into wood pulp $4,715,465 and paper $3,707,273. The United States took about 80 per cent. of the pulp and paper exported from Canada during 1920, while the exports to all other countries increased by about 75 per cent. as compared with 1919.

In addition to a substantial increase in the export business, a noticeable feature recorded was the number of new enterprises planned and begun, as well as the expansion of several of the older companies. In this connexion no statistics are available for 1920, but at the end of December, 1919, there were 99 plants, of which 33 made paper only, 39 pulp only, and 27 pulp and paper. Great interest was shown in the pulp supplies of British Columbia during the year, while developments also occurred on Vancouver Island and at Prince Rupert.

The Explosives Industry

Record Production in 1918

The last year of the war saw Canada producing explosives on a scale far in excess of anything which had previously been attempted in this line in the country before. Returns made by firms manufacturing explosives, fireworks and matches during 1918 have been compiled, and the statistics given in a report issued by the Dominion Bureau of Statistics reflect the progress of the industry in so far as the primary records taken in that year permit. With the passage of the Explosives Act, a scheme of co-operation was evolved whereby the Bureau and the Explosives Divison of the Department of Mines make use of a joint form for the collection of the statistical data required by the two Departments. This plan has permitted a considerable expansion to be made in the matter of detailed records, while at the same time it has cut down the work required of the manufacturer in making statistical returns to the Government.

Eleven firms manufactured explosives in Canada in 1918; of these, five were in Ontario, three in British Columbia, and three in Quebec. The total investment by all the firms engaged in this industry was $19,172,539; of this, $2,486,572 represented cash, trading accounts and bills receivable. Of the remainder, $12,444,785 was the value of the land, buildings, machinery and tools, and $4,241,182 represented the cost of materials on hand, stocks in process, finished products, fuel, and miscellaneous supplies on hand.

The average number of wage earners employed throughout the year was 4,708; these received a *per capita* payment of $1,213, or a total sum of $5,712,542. The 251 salaried employees received an average payment of $2,822, the total salaries paid being $708,305.

The cost of all the principal materials used during the year in making explosives was $23,125,839. The following table gives the quantity used :—

MATERIALS USED IN THE MANUFACTURE OF EXPLOSIVES.

Kind.	Unit of measure.	Quantity.
Sulphur or brimstone	Tons (2,000 lb.)	487
Nitrate of soda	,, ,,	35,680
Mixed acids	Lb.	46,500,958
Grain alcohol	,,	5,767,368
Charcoal	Tons	94
Sulphuric acid	,,	52,918
Nitric acid	,,	7,487
Benzol	Lb.	81,796
Caustic soda	,,	110,320
Diphenylamine	,,	71,688
Pyro	,,	7,058,193
Soda ash	,,	334,000
Sodium sulphite	,,	1,171,309
Oleum	,,	52,915,745
Toluol	,,	5,057,131
Linters	,,	13,168,430
Calcium chloride	,,	58,000

The products and by-products manufactured during the year in this industry comprised : Blasting powder, 796,225 lb.; dynamite, 21,674,046 lb.; smokeless powder, 8,664,800 lb.; mercury fulminate, 119,671 lb.; permissible explosives, 1,655,518 lb.; all other explosives, 64,650,061 lb.; acid recovered and sold, 4,394,646 lb.; ether, 105,820 lb.; nitre cake, 3,161 tons; and sulphuric acid, 2,218 tons..

Matches and Fireworks

Three establishments made matches and two made fireworks in Canada during the period under review. The total assets of the five firms were $2,364,289, and the average number of persons engaged in their manufacture was 617; the total wages paid amounted to $368,468, an average *per capita* payment of $597. The average payment to 47 salaried employees was $1,570, and to 570 wage-earners $517.

The imports into Canada of materials of interest in connexion with the manufacture of fireworks and matches were as follows : Potash, chlorate (not further prepared than ground), 19,438 lb.; potash, bichromate of, 20,844 lb.; phosphorus, 74,759 lb.; glue (powdered or in sheets), 928,126 lb.; starch (including all preparations having the qualities of starch), 2,434,281 lb.; rosin, 342,552 cwt.; gums, amber and arabic, copal, &c., to the value of $1,130,508.

Materials for use in the manufacture of explosives were imported as follows : Nitrate of soda, 103,992,033 lb.; binitrotoluol, trinitrotoluol and ammonium perchlorate for explosive manufacture, 38,724 lb.; grain alcohol, 10,790 lb.; charcoal to the value of $143,336; sulphuric acid, 11,907,466 lb; nitric acid, 139,272 lb.; caustic soda, 12,226,581 lb.; and brimstone, crude in rolls, or flour and sulphur, in rolls or flour, 194,123,528 lb.

Utilising Low-grade Ores

An associate committee of the Honorary Advisory Council of Scientific and Industrial Research of Canada, investigating the question of the utilisation of low-grade iron ores in the Dominion, has reported to the Council, and it is now regarded as highly probable that the vast deposits of low-grade magnetic iron ores can be successfully smelted on a commercial scale. The value of iron ores, iron, and steel imported into Canada exceeds £30,000,000 sterling annually, and 94 per cent. of the iron ore smelted there is imported. If the research is successful a saving of millions annually to Canada will be effected.

South Africa

Recent Developments in Oil Milling

Although the climate and soil in various parts of the Union of South Africa are suitable for the production of practically all soft oilseeds, investigation shows that South Africa is an importer of vegetable oils and seeds rather than an exporter of these commodities.

Writing from Capetown, the United States Vice-Consul says there are many factors which to a certain extent militate against an oilseed industry in South Africa, notwithstanding favourable climatic and soil conditions. Considerable quantities of the vegetable oils and seeds used come from countries where, in consequence of more favourable labour conditions, the cost of production is lower than in South Africa. Further, oils for manufacturing purposes, seeds, and beans imported into the Union are duty free. The principal consumers of oilseeds are at or near the coast, and the local producer is put at a disadvantage in competing with producers in the East by having to pay heavy railway rates as compared with low sea rates.

During 1918, 10,100 lb. of palm kernels were imported into the Union of South Africa from the Belgian Congo. During that same year 7,295,875 lb. of "all other oilseeds, nuts and beans" were imported. Of these latter, Portuguese East Africa supplied 5,254,389 lb.; Madagascar, 11,061 lb.; Zanzibar, 1,356 841 lb.; and British East Africa, 673,584 lb. In 1919, 161,748 lb. of mafeura seeds were imported from Portuguese East Africa, and imports of "all other oilseeds, nuts and beans" amounted to 5,072,732 lb. The principal countries of supply were; Portuguese East Africa, 3,189,594 lb.; Madagascar, 1,763,698 lb.; British East Africa, 106,624 lb.; and India, 12,816 lb.

Imports of Vegetable Oils

The following statement shows the quantities of the various kinds of vegetable oils, other than "salad oils," imported into South Africa during the pre-war year 1913 and in 1918 and 1919 :—

Vegetable oils.	Galls. 1913	Galls. 1918	Galls. 1919
Castor	114,869	75,560	97,725
Coconut	186,821	178,960	125,463
Colza and Rape	44,457	3,670	6,596
Cotton Seed	267,837	28	3,641
Linseed	421,246	413,426	218,944
Palm and palm kernel	106,440	506,957	3,732
Other	35,598	42,413	46,805
Total	1,177,268	1,221,014	502,906

In 1919 castor oil was imported chiefly from India and the United Kingdom; Coconut oil from India, Mauritius and Zanzibar; Colza and rapeseed oil from the United Kingdom; Cotton seed oil from East Africa; linseed oil from India, the United Kingdom and Canada; and palm kernel oil from the United Kingdom and the Belgian Congo.

Exports of Oilseeds and Oils

Exports of cotton seeds from the Union during 1919 amounted to 11,300 lb., practically all of which came to the United Kingdom. The total exports of vegetable oils (other than edible) and domestic manufactured during 1918 amounted to 232 gallons, comprising castor oil 8 gallons, coconut oil 200 gallons, cottonseed oil (non-edible) 8 gallons, and other kinds 16 gallons. In 1919 the total exports amounted to 5,758 gallons, of which 459 gallons was castor oil and 5,713 gallons "other kinds."

Up to a recent date the lack of proper facilities for grinding and the utilisation of the by-products had hindered the progress of the South African cotton-growing industry, the annual production of which approximates 3,000,000 lb. of seed cotton. Of this, approximately two-thirds, or 1,000 tons, consists of the seed itself.

In the absence of necessary plant for extracting the oil, it has been the practice to grind up the seed in its entirety and to sell it to the farmers for cattle-feeding purposes.

A recently-formed oil-mill company, which has erected a factory at Congella, purchased the greater part of the Union

production of cotton seed for 1920. The seed is converted into edible oils, and the residue utilised for the production of cake.

The *Pappea Capensis* plant is indigenous to the Cape Province. The seeds give a good yield of oil which could be used for soap making or as a lubricant. The residual meals from both the whole and the decorticated seeds are not such rich feeding stuffs as the corresponding products from cotton seed, and the presence of saponin gives them a slightly bitter flavour. Apart from a few experiments, no attempts have been made to exploit this seed and its oil on a commercial basis. In 1911, 25 tons of soya beans were imported into South Africa and distributed amongst farmers for planting. This effort did not meet with success, as the beans could not be grown at the price they then commanded in the world markets. Unexpected cultural difficulties were encountered, unpropitious weather conditions resulted in low yields, and the farmers found that they could not produce at a price which would enable them to compete with beans imported from the East. No subsequent attempts have been made to grow this crop.

Mafeura Seed and Linseed

That certain parts of South Africa are well suited to the cultivation of the castor bean is proved by the fact that the plant grows wild along the Natal coast, on the low veldt of the Transvaal, and in other subtropical areas. It still remains to be proved whether the cultivation of the particular kind or kinds at present growing in these areas in such profusion would be a commercial proposition or whether it would be preferable to secure seed of the best oil-bearing varieties from India or elsewhere.

Mafeura oil is extracted from the seeds of *Trichilia emetica* (imported entirely from Portuguese East Africa), and is used for soap making. The cake left after expressing the oil is useless as a cattle food, but it is sold in the South African market as a fertiliser. The value of the cake for manurial purposes lies chiefly in its nitrogen content, but in samples analysed the value is materially lessened by the high percentage (25 per cent.) of oil left in the cake.

Experiments carried out by the Department of Agriculture have proved that linseed can be grown fairly successfully in several districts throughout the Union, notably on the high veldt, where there is a good summer rainfall; the output, however, is not large. Linseed is grown chiefly by farmers for feeding to valuable stock on their own farms, for sale to chemists, to horse and cattle owners, &c., and for these purposes the supply is hardly equal to the demand. The estimated average yield per acre is a little over 200 lb. In view of the figure at which Indian linseed can be landed in South Africa in normal times, it is not believed that linseed is destined to become a crop of importance, since its cultivation for oil extraction is not likely to be profitable in the greater part of the Union.

Oil Milling

Three companies operate vegetable oil mills in Natal—one at Congella, one at Jacobs, and the third near Durban; the Congella firm is the South African subsidiary of a well-known English soap-making firm. Its mill crushes principally palm kernels, copra, and peanuts, the oil of which is used in the manufacture of soap and candles. The existing plant consists of a mill with a capacity of 150 tons of palm kernels per week. Additional machinery for treating copra and peanuts was recently installed, which has a maximum output of about 150 tons per week. In this connexion Vice-Consul Pisar states that practically all the oil-mill machinery is of American manufacture.

The Congella firm started the manufacture of oil cake as far back as 1911, but for several years very little interest was shown by the farming community in this kind of feed; to-day, however, the demand exceeds the output of the local mills. The company is also prepared to handle cotton seed, but has not attempted to do much in this line owing to the high prices asked for the domestic seed during the past few years. The hydraulic pressure, amounting to about 3,000 lb. per square inch, on the prepared peanuts or copra reduced the oil content of the cake to below 10 per cent. The mill at Jacobs, which can treat 300 to 400 tons of seed per month, crushes palm kernels, copra, peanuts, and, to a large extent, mafeura nuts; its output of oil is used principally for industrial purposes. Furthermore, three benzine extraction units have recently been installed, by means of which an additional 200 tons of seeds per month can be handled.

Iron and Steel Resources

Since 1909, when Sir Robert Kotze presented the first detailed report of South Africa's resources in iron ore, numerous other reports, mostly of a favourable nature, have been published, and among the latest and most enthusiastic of them all is that of Mr. Ernest Bury, O.B.E., an expert of the first rank engaged by the South African Iron & Steel Corporation to undertake certain investigations on their behalf. Mr. Bury has just returned to England, but before leaving Africa he gave a brief résumé of the results of his investigations.

Extensive Deposits

Dr. P. Wagner, in his exhaustive geological explorations, had placed beyond the shadow of a doubt the existence of vast deposits of hæmatite, clay-band and quartzite; ample supplies of good coking-coal within convenient distance of the iron ore, namely in the Middelburg district, have been proved by Mr. Nellmapius; dolomite and limestone for fluxing are within reasonable distance; and finally the economic factors in the establishment of this great and fundamental industry in South Africa, exhaustively studied and found satisfactory by Professor G. H. Stanley, have been amply confirmed by Mr. Harbord, Dr. Stead, F.R.S., and by Mr. Bury, who says that previous estimates, if they have erred at all, have done so on the conservative side.

Titaniferous Iron Ores

A practical demonstration of pig-iron smelting from South African minerals has been carried out by Mr. C. F. Delfos, in Pretoria. This small plant, says Mr. Bury, was erected to prove that the refractory character of South African ores was no drawback to their practical utilisation, and to prove, further, that certain coals in the Witbank area would make a suitable blast-furnace coke. But the demonstration has proved more than this. An excellent foundry iron has been produced, and thousands of tons sold during the experimental run; heavy castings have been made from Pretoria iron, including a mine winding-engine drum of 40 tons weight, and machinery parts of all kinds; and best quality steel-making iron, low in sulphur content, has also been produced. Mention should be made of the large deposits of titaniferous magnetite found in South Africa, and although these have hitherto been regarded as useless for iron making, the results of latest research seem to show that the difficulties in working this class of ore are being gradually surmounted, one of the most notable of recent contributions on the subject being Hesketh's paper on the titaniferous iron ores of New Zealand.

Mr. Delfos may perhaps think it worth while himself to undertake some experiments with South African titaniferous ore. Meantime it is interesting to learn that his small plant at Pretoria, turning out 10 tons per day, had produced iron at a cost which does not exceed that of present large scale production in England. And the coke obtained from a small retort oven at the same works in Pretoria, using the Witbank coals, was of very good quality and well suited for blast furnace use. Some of the samples examined were high in phosphorus, but, as Mr. Bury points out, this will not be detrimental in the basic open-hearth process, which will have to be adopted as the standard method for steel manufacture in South Africa; but if low phosphorus coals can be also found, the low phosphorus hæmatite ores of the Buffelshoek region can be used in the acid steel-making process for the manufacture of special steels.

Recovery of By-Products

Mr. Bury is confident that the South African Iron & Steel Corporation (formerly known as the Pretoria Iron Mines, Ltd.) has adequate reserves of raw material for an iron and steel works with an annual output of 150,000 tons per annum for at least one hundred years. The coal reserves also are such that there will be a considerable surplus for sale above the requirements of the iron and steel works. The small coal, which is often dumped at other collieries, will be used in iron and steel manufacture. The most up-to-date plant will be used, providing for the conservation of fuel and the recovery of by-products, so that the company can compete at least with foreign imports if not indeed in the world's markets generally.

The recovery of by-products is regarded as specially important, including not only fuel oils, motor spirit and fertilisers,

but also coal-tar dyes, high explosives and fine chemicals. All these and particularly the fuel oils and fertilisers should have an extensive and ever-growing market in South Africa; and if another great industrial dream can be materialised, namely the establishment of a South African woollen industry, like that suggested in Australia, then the coal-tar dyes would be in great demand.

Trade Commissioners' Visit

Mr. W. G. Wickham, Senior British Trade Commissioner in South Africa, is at present in this country on an official visit and is prepared to interview at the Department of Overseas Trade, from September 1 to September 16, firms who desire to obtain information as to trade possibilities in the Union of South Africa. Mr. Wickham will be pleased to meet manufacturers and merchants who may wish to consult him in regard to steps to be taken for opening up trade, and among the matters on which he is prepared to give information and advice are the general state of trade in South Africa, method of marketing and distributing of goods, terms of payment, rates of customs duties and general information as to openings existing for British goods. London firms desirous of consulting Mr. Wickham should communicate immediately with The Department of Overseas Trade, 35, Old Queen Street, London, S.W.1, quoting the reference 3092/T.G., and indicating briefly the subject on which the interview is desired. Mr. Wickham will subsequently visit some of the principal industrial centres of the United Kingdom.

Tenders for Creosote

The Municipal Council of Johannesburg invites tenders to be submitted to the Town Clerk, Municipal Offices, Johannesburg, before noon on September 22, for the supply and delivery in monthly instalments at Vrederdorp Store of 30 tons and/or 60 and/or 90 tons of creosote. A sample (not less than one imperial gallon) of the creosote tendered for must if possible be delivered to the Comptroller of Stores and Buyer, Room 53, Municipal Offices, Johannesburg, not later than the time of the closing of tenders. A copy of the conditions (general and special), specification and tender form may be seen by United Kingdom manufacturers and suppliers interested on application at the Enquiry Room of the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1.

West Indies

Market for Soaps and Perfumery

THE British Trade Commissioner at Port of Spain, Trinidad, in a recent communication on the trade of the West Indies, deals with their imports of perfumery, fancy soaps, and other toilet preparations. He states that in Trinidad *ad valorem* duties are calculated on the invoiced price converted into British currency at the market rate of exchange on the day on which the duty is paid. At the present rate of American exchange, therefore, a very substantial preference is given to British in comparison with American goods on which *ad valorem* duties are levied. The Jamaica and Barbadoes Customs tariffs will be revised in the near future, and a preference will be granted on British goods.

Having regard to the size of the trade there is a very large variety of makes of toilet preparations, British, French and American goods all being represented. American competition is strongest in fancy soaps, and French competition in lotions. The advantages of intelligent advertising are seen in the increasing popularity of the various preparations made by a particular American firm, who keep their agents in the West Indies supplied with small samples intended for house-to-house distribution. This method, however, did not prove successful, and the samples are now given away to the better-class patrons of the moving-picture theatres. Many of the stores have been induced to give special window displays of this firm's specialities, and it is to be noted that firms who, in the ordinary course of things, do not stock soaps and powders have assisted in these displays. British coal-tar and glycerine soaps appear to have no serious rivals in Trinidad, but in all other classes American soaps are the most popular.

With regard to perfumery, the report states that lotions are sold in very much larger quantities than extracts. French makes of the former are represented in some variety, but here again the Americans are making a big bid for the market. While extracts from all three countries are stocked, one or two British makes are popular; the large Spanish and French population are responsible for French extracts being in largest demand. Gift-boxes containing a variety of toilet preparations are stocked in limited quantities for the Christmas business.

There is a very large demand for talcum powders. British firms obtain a share of the trade, but an American firm have by far the largest sales. The latest quotation for a gross of tins in boxes of one dozen was $18·72 (£3 18s.), and the landed cost is more than £1 15s. under that of British talcums. It is said that the containers of the latter are derived from the United States; if so, part of this difference in price is accounted for.

In conclusion it may be said that while attractive boxing and wrapping are essential, British preparations are not behind their competitors in this respect, and although British prices may be slightly in excess of those of foreign makers, this point would be of comparatively small importance if the goods were efficiently advertised. Toilet preparations of all classes are stocked by druggists, but the wholesale business in Trinidad is done chiefly by the dry goods stores, who possibly retail the largest quantities of fancy soaps and extracts.

Indian Board of Scientific Advice

Review of the Year's Work

SPEAKING at the recently held Mysore Economic Conference the chairman of the Board of Scientific Advice (Mr. P. Raghavendra Rao, B.A.) said one of the chief things considered by the Board during the year was the idea of starting a sulphuric-acid factory in connexion with the ironworks at Bhadravati. It was considered desirable to start a sulphuric-acid factory not only for the purpose of the treatment of the grey acetate of lime with sulphuric acid to produce acetic acid, but also because the sulphuric-acid industry was a key to several other industries. The question was considered at several sittings of the Board, and recommendations were sent to the Government, who did not howevere ntertain the idea. The matter, however, was being considered once more in connexion with a reference made by the Agents of the Iron Works at Bhadravati to the Government who had referred it back to the Board.

The Board had also considered the manufacture of tannin extracts for which there was a large amount of raw material available locally. The other subjects that engaged the attention of the Board during the year were the manufacture of lac and the development of the sugar industry. A Forest Officer was deputed to Maihar, Central India, to study the methods of lac cultivation as practised by the Esociet Company on a large scale. The Forest Officer's study was more connected with the propagation of the lac and its production than its chemistry. In connexion with the sugar industry, the Board had approached a firm in London, who had referred the matter to the Imperial Department of Agriculture in Barbados, West Indies. The latter were prepared to undertake the training of one or two students who might be sent to learn the manufacture of sugar on a scientific basis.

The Board thought that some useful work could be done in future in the manufacture of drugs, &c., required for the medical department of the State. There was a small company in existence at Bangalore with a fully qualified chemist in charge, carrying on this work on a fairly large scale, and the medical department absorbed a fairly large proportion of its preparations.

New Steamship Service to Fiji

An arrangement has been made between the Fiji Government and the Commonwealth Government line of steamers whereby the latter will conduct a regular three-monthly service in each direction, via Panama, between the United Kingdom, Fiji and Australia. The first steamer under the new arrangement, homeward bound, is the s.s. *Bulla*, which left Sydney on August 6, and is due to leave Suva about August 20 for London and Hull. Outward, the first steamer will be the s.s. *Australrange* (7,250 tons), sailing from London on September 15, Liverpool September 22 and Glasgow September 27. Cargo will be taken for Suva and Levuka (Fiji) direct, Brisbane, Sydney and Melbourne. The rates of freight to and from Fiji will be the same as those in force between the United Kingdom and main Australian ports.

Chemistry Students in Industrial Laboratories

To the Editor of THE CHEMICAL AGE.

SIR,—Allow me to reply to the article by "Works Chemist" under the above heading; but, before doing so, let me say that I am one of those chemists who have not got any "magic" letters tacked on to my name. At the same time, I am not so foolish as to sneer at those who have. The obvious retort is "sour grapes."

"During the war youths and girls flocked into the laboratories to do routine work. They required no knowledge of chemistry ——" That work is being done now, as it was before the war, and during the war. Because a man has been doing it for a number of years, and is naturally more accurate and quicker, that does not make him a chemist any more than a man who draws teeth is a dentist because of that fact.

There are "wrinkles" to be picked up in every laboratory, and if "Works Chemist" thinks that by giving away a few of his special wrinkles he has trained a chemist he is making a sorry mistake.

Employers of labour are not impressed by "magic" letters, but the letters do imply that the person holding them has gone through a certain course of training. Should he prove a "dud," however, he will find that he might with more confidence rely upon the assistance of his grandmother than upon his letters.

I am not a member of the N.A.I.C., but I am quite in sympathy with its objects or any other society or organisation which aims at the raising of the status of the chemist. I realise that before one can do that we must define what we mean by chemist. That definition has got to be fixed by chemists, and when it is fixed we cannot have any Tom, Dick or Harry coming along and saying, "I am a chemist; you must let me into your society." If "Works Chemist" agrees with me so far he will also agree that the best way to fix what a chemist shall be will be by examination. At present the best thing we have got is a university degree, the A.I.C. and the F.I.C. Of course, "Works Chemist" will retort: "Where do you and I come in?" Personally, I do not care very much where I come in. When such a body is formed, I shall be quite willing to lay my claim before them to be one of their number and bide by their decision. Please do not run away with the idea that I am a member of the B.A.C. I am not. I should certainly be a member of either the B.A.C. or N.A.I.C. did I feel that by being a member of such an organisation I was assisting in raising the status of the chemist; but the first big move must be made by the people recognised by the outside world—*i.e.*, the academically trained men.

The first duty of such an association will be to tackle the "tester" question. I cannot deal with that here, but it is the "tester" difficulty which prevents chemists from raising their status, and if ignored will continue to do so.

We shall not achieve our object by cheap sneers at "magic letters," but by having an organisation with the highest qualification for membership, and we who are works chemists, but hold no academic qualifications, can, I think, best help this along, even if debarred from such an association, by drawing up schemes of study for testers, giving them time off for study, and getting rid of any tester who does a particular routine test accurately and well but takes no interest in the wider field.—Yours, etc.,

HENRY HILDITCH.

Burntisland.

The Dye Industry in Shantung

STANDARDISATION and increase of the dye industry in Shantung is the aim of the Ministry of Agriculture and Commerce, which has sent representatives into that province to conduct an investigation. Shantung produces large quantities of blue, red and yellow dyes, which are said to compare favourably with the best coal-tar colouring agents produced in other countries. The Ministry believes that some of the provinces can produce the dyes in larger quantities than are required for Chinese industries. The investigating agent will learn the extent of the vegetable crops from which the dyes are made, and will try to encourage a larger production.

Chemical and Dyestuff Traders

Effects of Recent Legislation

IN a circular issued this week to members the Chemical and Dyestuff Traders' Association state that they have made repeated inquiries at the Board of Trade respecting the list of chemicals to be included in the Schedule to the Safeguarding of Industries Bill (which received the Royal Assent last week and comes into operation on October 1st), but that the Department declines to disclose any information prior to the official publication of the document. The Association, however, believe that the list has been completed, and is now in the printer's hands. It is expected to be on sale within a week or a fortnight.

The Association have drawn the attention of the Board of Trade to serious complaints as to delays in the granting of licences for the export of goods to this country from the Occupied Territory in Germany. The Board have replied stating that they have laid the matter before the Foreign Office with a suggestion that the attention of the British Delegate on the Inter-Allied Rhineland High Commission should be called to the matter.

The Association have also called the Board's attention to the fact that in the United States of America much fuller information is available to traders than in this country relating to stocks of dyestuffs in the hands of the Government and the quantities imported from time to time, and suggested that it would be of considerable interest and advantage to the trade if similar information of an official character could be periodically published in the *Board of Trade Journal*, or through other suitable channels. In their reply the Board state that the question of the publication of information relating to the stocks of dyestuffs which have been obtained from Germany as Reparation, and also of the quantities imported under licence has already been under consideration but it was decided that the proposal was not one which it was possible to adopt. As regards the Reparation supplies the Board point out that the kinds and quantities available are very diverse, while numerous sales of a miscellaneous character are made daily so that any published list of stocks would quickly become out of date and, consequently, of little value. In addition, any customer or trader requiring supplies can obtain immediate information as to the quantities available by application either to the Board of Trade or direct to the Central Importing Agency, 517, Royal Exchange Buildings, Manchester; or, 46, St. Mary Axe, London, E.C. 3.

In reply to inquiries as to the position of imports not of German origin, but arriving in this country via Germany, the Association point out that in the case of goods shipped from German ports which have not been first consigned from Germany—for example, goods consigned from Czecho-Slovakia, but shipped from Hamburg—documentary evidence in the form of a through bill of lading, railway consignment note, invoice, &c., showing consignment to the United Kingdom from the original point of despatch must in all cases be produced to the Collector of Customs and Excise at the port of importation.

In reply to inquiries at the Board of Trade the Association are definitely informed that the Safeguarding of Industries Bill will come into full operation on October 1, and that all articles included in the Schedule to Part I. of the Bill (which deals with synthetic organic chemicals, &c.) will be liable to duty if they arrive on or after that date. This ruling applies to all goods on order prior to October 1.

Government Contracts

The following were among the Government contracts let during July:—

ADMIRALTY (CONTRACT AND PURCHASE DEPT.).—*CO_2 Producing Plant*: J. & E. Hall, Ltd., Dartford, Kent. *Salt*: Salt Union, Ltd., Liverpool; Weston and Westall, Ltd., London, E.C. *Soap, Liquid Phenol*: McDougall Brothers, Ltd., Manchester. *Soap, Hard*: Price's Patent Candle Co., Ltd., London, S.W.

AIR MINISTRY.—*Cement, Portland*: Tunnel Portland Cement Co., Ltd., Lloyd's Avenue, E.C. *Varnish and Solvent*: Cellon (Richmond), Ltd., London, W.

POST OFFICE.—*Oil, Colza*: James Arnott & Sons, Ltd., Newcastle-on-Tyne.

Chemical Trade Wages Dispute

Still Some Hope of Settlement

THE dispute with regard to proposed wage reductions of 2d. per hour was brought before the attention of the Conference of the Federation of General Workers at Blackpool on August 19, and after statements by Messrs. Fleming and Kelly, a resolution was passed, on the chairman's suggestion, empowering a delegation from the Conference to discuss with the employers differences already considered by the Joint Industrial Council for the Chemical and Salt Trades and inviting the employers to give friendly response to the invitation. The resolution proceeded: "This Conference regards the ballot vote of work-people involved as the natural result of demands of further large reductions of wages, but we are of opinion that neither the result of the ballot vote nor the employers' threat to close down their works justifies the present deadlock, which we believe can be terminated with satisfaction to both parties by means of a further conference."

At the end of last week the Chemical Employers' Federation considered the situation arising from the employees' refusal to accept the reduction, and the Federation decided to inform the unions concerned that the employers would undertake that the new rate of wages should under no circumstances be further reduced during the present year.

Further but unsuccessful efforts to settle the dispute were made at a Conference of the Joint Industrial Council, representing employers and employed, at the Ministry of Labour on Tuesday afternoon. The Conference broke down in the evening, and the matter was referred to the Ministry of Labour. The original demand of the employers for a reduction of 2d. per hour was subsequently varied by a proposal to fix a basic rate and an addition on the sliding scale principle, varying with the cost of living; this was not accepted by the workers. The employers then proposed a reduction of 1½d. per hour on condition that the workers' side of the Joint Industrial Council should recommend it for acceptance. No agreement could be reached, however, and the employers finally gave notice of the 2d. per hour reduction.

Mr. W. T. Kelly, joint secretary of the work-people's side of the Joint Industrial Council, made the following statement at the close of the conference on Tuesday:—

"In their endeavour to find a solution of the difficulty the workers' representatives offered to accept a reduction of 1d. per hour now and to meet the employers again on October 28 to consider the question of a further reduction of 1d. per hour. This was turned down by the employers. A further proposition which was considered was a suggestion from the workers to accept 1½d. per hour reduction with no further reduction until June, 1922. This was refused by the employers. The employers were then asked to stabilise rates until March next, but they would not agree. They were then invited to agree to a submission of the whole question to a third party, the choice of whom would be left to the two sides of the Joint Industrial Council, but their reply was that they would not agree to arbitration of any kind.

"From this it will be seen that the workers' representatives went further than the mandate given to them by the men, but the attitude of the employers was such that there was no possibility of agreement on other than the terms which the employers have imposed. This raises a serious position in the whole trade, and the unions are taking steps to cope with the situation and are in communication with all centres where chemicals are produced.

"It is interesting to note," continued Mr. Kelly, "that one section of the chemical industry—namely, the salt trade—had a conference at the Crewe Arms Hotel, Crewe, yesterday, at which the men who are on strike in salt works offered to settle the wages question by the acceptance of a reduction of 1d. per hour for time workers, and 5 per cent. to piece workers, but the section of the employers concerned with the salt industry were unable to agree to any modification of the 2d. per hour without consultation with and the sanction of the main body of the chemical trade. The feeling in this dispute is very high, and the general opinion is that the employers were unwise in not settling on the conditions which were offered to them on Monday.

"It may also be noted that in addition to the salt workers being on strike, the men in the chemical industry in South Wales have also come out on strike consequent upon the action of employers in that district in insisting upon the men agreeing to the reduction, despite the fact that conferences were pending, and that the matter was in the hands of the trade unions.

"We now await the result of the efforts of the Ministry of Labour on this matter. The employers were notified on August 13 of the result of the ballot vote, which showed a 25 to 1 majority against accepting the reduction, and that unless a reasonable adjustment took place before August 27 the men would cease work on that date."

On Wednesday a further attempt was made at the Ministry of Labour to reach a settlement and in the afternoon Mr. W. T. Kelly informed a representative of THE CHEMICAL AGE that a conference of the men's representatives with the Ministry of Labour would be held in Manchester on Thursday.

Up to the time of going to press we had received no report of the proceedings.

It was reported on Friday that 90 per cent. of the employees of Brunner, Mond & Co. had signified their intention to remain at work even if the strike was ordered.

Strike Position in Wales

A CORRESPONDENT states that the chemical men at Messrs. Vivian's works at Swansea and the Briton Ferry Chemical Works are already out on strike over the proposed reduction of wages and both sides seem determined not to give way. In a further report he says that Mr. D. Bonham, secretary of the Chemical Workers at Swansea, received a communication on August 18 that the executive of the Transport and General Workers' Union had resolved to support the men to the fullest extent in the dispute.

The Affairs of Walter Everitt, Ltd.

Winding-up Order

A WINDING-UP order was recently made in the case of Walter Everitt, Ltd., Norwood Wharf, Southall, Middlesex, manufacturing chemists. The statement of affairs shows liabilities £1,681 17s., while the total assets amount to £10,634 0s. 1d. After deducting £9,783 11s. 2d. in respect of loans on debentures and £308 10s. for preferential claims, the net assets amount to £541 18s. 11d., thus leaving a deficiency as regards the unsecured creditors of £1,139 18s. 1d. The assets comprise: stock in trade at cost £832 12s., estimated to realise £300; machinery £4,000; trade fixtures, etc., £100; leasehold land and buildings at Southall, £6,000; good book debts, £234 0s. 1d., and a bad debt £2. 6s. The issued share capital of the company amounts to £9,000, so that the total deficiency is £10,139 18s. 1d. The present position is attributed to the fall in prices of materials owing to foreign importations. It appears that the company was registered on September 23, 1919, as a private company, being formed for the purpose of acquiring as a going concern the business of an analyst and manufacturing chemist formerly carried on by W. Everitt & Co., Ltd., then in liquidation. The company is stated to have been promoted by Mr. Walter Everitt, Mr. Arthur Cunningham and Mr. James K. Bisgood, who arranged for the purchase of the assets of W. Everitt & Co., Ltd., from the liquidator of that company for £6,487 in cash, Mr. Walter Everitt at the same time undertaking to waive a claim against the company in liquidation for damages. On October 21, 1919, the assets were re-sold to the company for £15,000 with the exception of the stock, which was separately valued at about £500. The purchase money was satisfied by the issue of 9,000 fully-paid £1 shares and £6,500 debentures. The nominal capital of the company is £10,000 divided into £1 shares, of which 9,000 have been issued as fully paid. In addition to the £6,500 debentures issued in part payment of the purchase money, the following further issues appear to have been made in respect of cash advanced:—October 21, 1919, £1,200; December 20, 1919, £200; January 20, 1920, £100; and May 11, 1920, £2,000. No directors' fees appear to have been paid. The usual books of account have been kept, but the trading books are in the possession of the Receiver for the debenture holders.

United Premier Oil and Cake Company

Last Year's Record Output

SPEAKING at the second ordinary general meeting of the United Premier Oil & Cake Co., Ltd., on Tuesday, Mr. H. Guedalla, F.C.A. (the chairman) said the period under review had been most difficult for this particular industry, and it had required the closest and keenest attention to business to steer a safe course for the various concerns, which included Wray, Sanderson & Co., Ltd., J. L. Seaton & Co., Ltd., the **Premier Oil Extracting Mills, Ltd.,** Sowerby & Co., Ltd., and the Universal Oil Co., Ltd. For the last nine months of 1920 there was a continuous drop in the price of the company's products, and they had to legislate accordingly. During this period their subsidiaries had been engaged in making considerable additions, and the extensions and improvements in plant mentioned last year were now about completed, and had proved to be quite up to expectation in regard to output, efficient and economical working of the mills and refineries, so that they could fairly claim to have as up-to-date plant and buildings as any similar concerns in this country. The railway sidings in connexion with the Premier Oil Mills were now in part working order, and would prove to be a valuable acquisition to this property. They had about 4½ acres of spare land on this site, and this was being laid out as a sports field for the staff and workmen.

The research department had carried out some good work, and their investigations proved of great value in the efficient working of the mills. The amount of seed and nuts treated during the year was in excess of any previous 12 months.

With regard to the current year's prospects Mr. Guedalla said they had gone a long way into the current year, and the results so far were quite satisfactory. This was the more gratifying in view of the unfortunate position in which the general trade of this country stood to-day. With so many adverse factors, it was impossible to see daylight yet. The whole root of the evil had been the policy of deflation which had been so rigidly enforced. In this country we had two classes of capital, one which employed productive labour and the other which employed money only, and it had been unfortunate that the advice of the latter had predominated in the policy to be pursued. The trade of the country was short of working capital. It was an acknowledged fact that for any single business to maintain the pre-war turnover the enhanced cost of labour and most material rendered more cash requisite, while on top of this the enormous Government and local taxation had become an intolerable burden on its cash resources.

In the past one effect of bad trade had been to create an abundance of money, but this was not the case at present, and it was obvious that some inflation would be necessary if enterprise was not to be stifled and if there was any real desire to check this large amount of unemployment.

Although their particular business was in a strong financial position, they felt that they could do much better with any improvement in the general trade of the country. In this connexion no real improvement could come until foreign trade could be revived. While the world's exchanges were in the state in which we found them the reduction in the cost of labour and in the price of certain commodities produced in this country was merely playing with the matter. To ensure settled peace conditions in the world it was essential to restore the trade position, and if the temporary lowering of the value of our pound sterling to some well-balanced basis would assist in this purpose such a scheme should not be ignored simply because it did not suit a few important people, or because we owed money to another country.

To those who know the position the moral effect of unemployment was simply appalling. This problem should be tackled in a practical manner without delay, and many a trade could get into its stride again if only a slight fall in the value of our exchange would permit of competitive sales abroad. Until these questions were settled it would be impossible to look far ahead.

A representative of a Danish company is reported to have arrived in Riga for the purpose of studying the LATVIAN CEMENT INDUSTRY. He has applied to the Finance Ministry for permission to build several small cement works to enable the company to carry out reinforced concrete constructions in Latvia.

A Caustic Potash Deal

Judgment in Breach of Contract Claim

IN the Scottish Court of Session on August 17, Lord Ashmore issued judgment in an action by Campbell & Co., soap manufacturers, 360 and 362, Gallowgate, Glasgow, against Ferguson, Shaw & Sons, soap manufacturers, Imperial Oil Works, Port Dundas, for £362, damages for alleged breach of contract.

The pursuers said that in October, 1919, the defenders contracted to supply them with a drum of pure caustic potash for use in the manufacture of neutral soft soap, and that the defenders supplied caustic potash which contained impurities, and which was unsuitable for the purpose for which it had been bought.

Lord Ashmore assoilzied the defenders and found them entitled to expenses.

His Lordship said the material questions of fact related to the terms of the contract, the alleged breach of contract, and the relative claim of damages. As regarded the terms of the contract, the following propositions seemed to his Lordship to be established by the evidence: (*a*) That at the time of the sale the pursuers did not disclose to the defenders the particular purpose for which the pursuers intended to use the caustic potash; (*b*) that the defenders did not guarantee or represent or describe the drum of caustic potash to be supplied by them as 100 per cent. caustic potash, or in any way as being absolutely pure caustic potash; (*c*) that the defenders sold the caustic potash as "pure" caustic potash, but that this description meant only that the caustic potash was "commercially pure," and that in the case of solid caustic potash sold in October, 1919, the potash was "commercially pure" provided it consisted to the extent of at least 88 per cent. of hydrate of potash. The propositions which his Lordship had been affirming negatived *inter alia* a contention of the pursuers to the effect that the defenders gave a guarantee or made a representation that the caustic potash would be of 100 per cent. purity. As regarded the alleged breach of contract, his Lordship was of opinion that the pursuers had not proved that the drum of caustic potash as supplied by the defenders was disconform to the contract in any respect. On October 16, 1919, the caustic potash in the solid state was delivered at the pursuers' works. It was enclosed in the same iron drum in which it had been imported into this country from Germany—the drum never having been opened by the defenders.

On December 10, 1919, the pursuers, for the first time, informed the defenders of the pursuers' failure to make soap from the caustic potash which had been delivered by the defenders on October 16, and which had been paid for by the pursuers without complaint on November 4, 1919.

With regard to the evidence for the respective parties on the question of disconformity to contract, stated generally, on the one hand the case for the pursuers was that the drum of caustic potash was shown to have been impure by reason of the results of an analysis, whereas on the other hand, the defence was that the impurities found in the analysis of the solution, in so far as these were in excess of what characterised caustic potash which was commercially pure, must be attributed to carelessness on the part of the pursuers themselves in their treatment of the solution in their own premises. The paucity of direct evidence as to the true quality of the caustic potash and as to the conditions under which the lye was made and kept and treated by them during the first eight or nine weeks succeeding the sale was probably mainly due to their failure at the time either to inform the defenders of the difficulty experienced in making soap or to seek advice from any practical or skilled third party. The burden of proving disconformity to contract lay on the pursuers; and, weighing the evidence as a whole, his Lordship had come to the conclusion that the burden of proof had not been discharged by the pursuers. His Lordship thought he ought to add that on the assumption, contrary to his opinion, that there had been a breach of contract and that damages were exigible, he was further of opinion that the amount of damages claimed by the pursuers was excessive, and that on the assumption figured an award of £50 would be sufficient.

A new sugar factory which was erected at Bybrook, in the parish of St. Catherine, Jamaica, started MANUFACTURING SUGAR in February of this year. A second new sugar factory at Mexico Estate recently took its first crop of sugar.

Chemical Matters in Parliament

Leadless Paints Committee

In reply to Captain Bowyer (House of Commons, August 19), who asked the Home Secretary the composition and terms of reference of the Committee which he had promised to appoint to examine the recent further evidence as to the results obtained with leadless paints, and would he state what were the qualifications of the members, Mr. Shortt said he hoped to make an announcement shortly.

Safeguarding of Industries Bill

Captain Wedgwood Benn (House of Commons, August 19) asked the President of the Board of Trade whether any appointments had yet been made to the Board of Trade Committee under the Safeguarding of Industries Bill.

Mr. Baldwin said the formation of the permanent panel from which Committees would be appointed was engaging his attention, but no formal appointments could be made before the Bill became law.

On the adjournment of the House (August 19) Mr. Speaker reported the Royal Assent to the Safeguarding of Industries Act, 1921.

Colonial Trade Commissioners

Sir H. Brittain (House of Commons, August 16) asked the Parliamentary Secretary to the Overseas Trade Department whether, in view of the very great importance of the Canadian market to British exporters, he could inform the House as to the reasons for the resignation of the senior Trade Commissioner for Canada and Newfoundland; whether this position had been filled again; and, if so, who had been appointed?

Sir W. Mitchell-Thomson said that Captain Edwards had resigned the appointment of His Majesty's Senior Trade Commissioner in Canada and Newfoundland because he felt that the office and travelling allowances attached to the post were not adequate for the proper performance of his functions. The allowance for office expenditure was considerably increased as from the beginning of the current financial year, and as a further increase could not be contemplated, having regard to the urgent necessity for economy, there was no option but to accept Captain Edwards' resignation. This was done with the greatest regret, in view of the admirable work which Captain Edwards had performed in the interests of British trade. As regards the last part of the question, it was proposed to transfer Mr. Milne, at present Trade Commissioner at headquarters, to Montreal, of which post he had had previous experience.

Alkali Industry

Mr. R. Richardson (House of Commons, August 18) asked the President of the Board of Trade whether the Sub-committee or the Standing Committee on Trusts which appointed the Sub-committee on the Alkali Industry, expressed any view as to the desirability or otherwise of publishing the Alkali Report; and whether the Board of Trade could adduce any reason for withholding publication which would not have applied in the case of certain reports which had already been published.

Mr. Baldwin said no such view was expressed to the Board of Trade either by the Sub-committee or by the Standing Committee. With regard to the last part of the question, he would refer Mr. Richardson to the reply given on August 9 to Mr. Myers (*see* THE CHEMICAL AGE, Vol. V., p. 211).

Mr. Alfred Davies (House of Commons, August 19) asked the President of the Board of Trade whether a combination existed in the alkali industry; if so, what were the firms comprising it; and what was the scope of its operations.

Sir W. Mitchell-Thomson said he understood that there was an agreement in the alkali industry between Messrs. Brunner, Mond & Co., Ltd., and the United Alkali Co., Ltd., and that the object of the agreement was to regulate prices and sales of certain products. He was informed that the agreement did not limit output or extend to labour conditions.

Zinc Concentrates

Lieut.-Commander Kenworthy (House of Commons, August 18) asked the President of the Board of Trade what was the total tonnage of zinc concentrates held by the Government on March 31, 1921; what additional tonnage had been acquired in each month since that date; whether it was intended to allot to the home smelters any of these concentrates at a low price with a view to assisting that industry; whether, if this was so, steps would be taken to enable home mines to obtain an economic price for their production; and whether he saw any early prospect of disposing of the current Australian production, in addition to the accumulated stocks, at a price that would cover the original purchase cost, with interest and other expenses?

Mr. Baldwin, in a written reply, stated that the total quantity of zinc concentrates held by the Government on March 31, 1921, was 573,685 tons. Since that date the following additional quantities had been delivered under the contract, namely: 11,943 tons in April, 14,085 tons in May, 16,677 tons in June, 17,758 tons in July, and 22,418 tons in August. Having regard to the present market price of spelter, the Government were prepared to consider any offers from home smelters for these concentrates which were reasonable in the circumstances, but the price which home smelters might obtain for the spelter produced was entirely a matter for them. In view of present market conditions, he saw no prospect at present of disposing of the stocks at prices equivalent to the original purchase cost. He did not know of any steps likely to commend themselves to the Government which would enable home mines to sell their output at a higher price than that ruling in the market.

Excess Profits Duty

Mr. Wise (House of Commons, August 16) asked the Chancellor of the Exchequer if amounts refunded on account of Excess Profits Duty were to be treated as income; and, if so, how they were to be taken into account, in view of the fact that in many cases the net loss actually exceeded the total amount paid on account of this tax?

Sir R. Horne said he would refer Mr. Wise to the provisions of Rule 4 (1) of the Rules applicable to Cases I. and II. of Schedule D of the Income Tax Act, 1918, from which he would see that the amount of repayment of Excess Profits Duty was required to be treated as profit for the year in which the repayment was received. In the type of case suggested the rule worked as follows: If a trader had made a loss of £10,000 for a given year without taking into account a repayment of £4,000 Excess Profits Duty received within that year, then for the purposes of subsequent years' Income Tax assessments the result of that year would be taken as a loss not of £10,000 but of £6,000, that was, a loss of £10,000 less the profit of £4,000 represented by the Excess Profits Duty repayment.

Sir A. Churchman asked the Chancellor of the Exchequer whether any Orders in Council had been given whereby relief in respect of Excess Profits Duty paid in any Dominion or Colony might be granted, as provided in Section 23 of the Finance Act, 1917; and, if not, whether it was the intention of H.M. Government to enter into arrangements with any of the Dominions or Colonies in order that a person might be able to obtain the relief to the extent indicated in that Act.

Mr. Young said one Order in Council had been made under the provision in question, and other cases were under consideration. It would be appreciated that the arrangements contemplated by this provision could only be made by agreement with the Colonial Governments concerned, and he assured Sir A. Churchman that they were fully prepared to discuss the matter with any Colonial Government that wished to enter into such an arrangement with a view to the necessary Order in Council being made.

CALICO PRINTERS' ASSOCIATION.—The directors state that the Association has experienced an unsatisfactory trading year, in which as holders of large stocks it has suffered the full force of the depreciation in values, but the whole of its commitments have been taken up, and all stocks written down to market value. Having regard to this, and to its claim for repayment of Excess Profits Duty, the directors recommend a dividend of 5 per cent., less tax, on both preference and ordinary shares. As a settlement with the revenue authorities has not been completed, the annual meeting will be adjourned to a later date, when the accounts for the year ended June 30 will be presented. Last year the ordinary shareholders received 10 per cent.

From Week to Week

Mr. THIERRY has been appointed assistant in the chemistry department at University College, London.

The Canadian Pacific s.s. *Melita*, carrying the United Kingdom delegates to the annual meeting of the Society of Chemical Industry, arrived in Montreal on August 19.

Ten cargoes of PATENT FUEL, totalling 17,246 tons, were exported from Swansea on August 16, the largest amount exported in a single day for a considerable period.

TOM ELLAND, an employee at Messrs. Brown's Chemical Works, Savile Town, Dewsbury, Yorks, was badly burned on the face and neck on August 18 through the splashing of a vat of crude carbolic on being opened.

Messrs. DIGGORY & CO., export merchants and chemical brokers, lately of 38, Union Street, Liverpool, announce that they have taken over larger offices at 81, Dale Street, Liverpool, to which address all communications should in future be sent.

The factory built at Southall, Middlesex, in 1915 by the LONDON CHEMICAL WORKS, LTD., for the manufacture of salicylic acid and sodium salicylate will be re-opened at the end of this month. The works, it will be remembered, were closed down in the spring of this year.

MR. JOSEPH BENSON, head of the firm of G. C. Dobell & Co., Ltd., nitrate merchants, of Rumford Street, Liverpool, has purchased His Majesty's Theatre, London. This is not Mr. Benson's first theatrical enterprise, as he is the owner of the Shaftesbury Theatre, London, and is also connected with the Little Theatre.

The DROP IN PETROL PRICES announced last week was naturally accompanied by a reduction in other PETROLEUM PRODUCTS. Shell-Mex, Ltd., announced on Tuesday that the wholesale prices of their "Snowflake" and "Empire" brands of lamp oil were reduced by 5d. per gallon respectively. Mex fuel oil has been reduced to 75s. per ton ex tank.

The death took place on August 18 of Mr. JOSEPH HARTLEY, of Mayfield Villas, Hebden Bridge, at the age of thirty-eight. Son of the late Mr. William Hartley he carried on the soap and chemical manufacturing business established by his father at Royal Works, Hebden Bridge. Mr. Hartley, who was a Freemason, leaves a widow and two daughters.

The Cardiff authorities are investigating complaints that a nuisance is caused by the NATIONAL OIL REFINERY at Skewen through crude oil finding its way into the drain pipes and into a brook, which are so charged with oil wastage from the refinery that dead eels have been seen floating on the surface of the brook and domestic animals have died through the effects of the polluted water.

The report for June of the AMERICAN CYANAMID CO. states that operations during June were at reduced capacities at all plants. Manufacturing operations at the Amo-Phos plant were completely suspended. At the cyanamid plant at Niagara Falls the operations were on the basis of approximately 45 per cent. of capacity. At the phosphate mines at Brewster, Fla, the mining operations were on the basis of approximately 68 per cent. of capacity.

We are informed that the sole agents in the United Kingdom for the SHARPLES SUPER-CENTRIFUGE, manufactured by the Sharples Specialty Co. of New York, are United Water Softeners, Ltd., Imperial House, Kingsway, London, W.C.2, who alone deal with all questions affecting the technical application, sale and installation of these machines. All enquiries in this connexion should be addressed to them at their Kingsway offices. The Sharples Super-Centrifuge is known in its application to the clarification of liquids, and separation of immiscible liquids and oil emulsions.

It was reported on Monday that, subject to a flat reduction of wages of about 3s. 2d. per day, Scottish Oils, Ltd., are now PREPARED TO RESUME WORK at the following works and mines: Addiewell Works, crude department; Dean's Mines; two mines at West Calder; Westwood Pit, Mid-Calder; Oakbank Works, Roman Camp Works, and certain mines in Broxburn. This will absorb 60 to 70 per cent. of the normal number of employees. There will be no immediate resumption in the Lower Broxburn section, Young's section works and mines, and Tarbrax works and mines. It was announced on Thursday that the miners, as the result of a ballot, had agreed by a very large majority to the reduction.

A two-storeyed building, comprising the stores and glue-drying premises at the Grove Chemical Works of British Glues & Chemicals, Ltd., at Appley Bridge, near Wigan, was DESTROYED BY FIRE on August 21. The spread of the fire to adjoining premises was only prevented by the combined efforts of the Wigan fire brigade assisted by the Company's private fire brigade, and the brigade of the Lancashire & Yorkshire Railway Co. Over 300 tons of glue were in the stores at the time of the outbreak, and it is estimated that the damage amounts to not less than £30,000.

Experiments are being carried on in Canada with regard to the BY-PRODUCTS OF SUGAR-MAKING, which it is hoped to make commercially useful in the near future. It is estimated that from the product of 1,000 trees from 25 to 30 gallons of very fine vinegar could be obtained from materials that are usually thrown away. This vinegar is said to be superior in flavour to white wine vinegar. Another valuable by-product is "sugar sand," which contains calcium bimalate and malic acid. Of the maple sugar annually produced in Canada more than two-thirds comes from Quebec, while Ontario produces a quarter and the Maritime Provinces the rest.

A meeting of those interested in the organisation of the RUBBER SHAREHOLDERS' ASSOCIATION was held on Wednesday afternoon. There was a long discussion, at the conclusion of which it was decided to incorporate the association. A provisional committee was appointed to arrange for a permanent committee and to carry out all the detail work in connexion with the formation. The subscription has been fixed at half-a-guinea per annum, but large shareholders will be invited to contribute over and above this sum if they care to do so. The principal object of the association is "to organise opinion among shareholders of rubber-planting companies regarding schemes for control and for restriction of output, and regarding any other matter affecting the interests of shareholders."

The attention of British subjects resident in this country who have PRE-WAR DEBTS owing to them from branches outside Germany of German undertaking, whose Head Office is in Germany, is drawn to the fact that apart from their remedy against the branch, they may be entitled to claim payment alternatively from the Head Office through the Enemy Debts Clearing Office. In the event of there being any doubt as to recovery of such debts from the branch British creditors will be well advised to file a claim against the Head Office with the Enemy Debts Clearing Office, Cornwall House, London, S.E.1. It is essential, however, that any such claims should be received by the Clearing Office before September 30.

The University of Birmingham has founded a Department of Brewing and of the Biochemistry of Fermentation. It will be in charge of the Adrian Brown Professor, Arthur R. Ling, M.Sc., F.I.C., and it has been established for THE STUDY OF APPLIED BIOCHEMISTRY, especially in connexion with malting and brewing and the fermentation industries generally. It deals with agriculture and cognate industries, chemistry and bacteriology as applied to food and drugs, water supply, the treatment of sewage, etc. The courses of instruction provided are: A degree course; a diploma course; certificate courses for brewers and for maltsters, who are unable to devote the time to study required for the diploma course; and shorter courses of lectures and practical work in the principles of malting and brewing. There are also facilities for training in agricultural chemistry, the chemistry of food and drugs and of water, and the chemistry of bacteriology and sanitation.

On his appointment as managing director of the Slag Phosphate Co., Ltd., Mr. G. V. PARKER, who recently secured the entire British allotment of Nauru phosphate from the Phosphate Commissioners, has been presented by the company's staff with a fitted suit-case. The presentation, which took place at the Newport offices, was made by Mr. Bevan, accountant, who referred to the qualities which had placed Mr. Parker in a position of leadership not only in that company, but in the fertiliser industry. Replying, Mr. Parker remarked that he valued the presentation especially at this time, inasmuch as, seeing their operations were extending and becoming more national than local, he was likely to be subjected to criticism both inside and outside Parliament by those to whom he was personally unknown. He felt, however, that he had no need to heed uninformed criticism when those who knew him best adopted such a graceful way of expressing their loyalty and confidence.

References to Current Literature

British

PHOSPHATES. The phosphate industry. Part I. Sources of supply of mineral phosphate. W. Packard. *J. S. C. I.*, August 15, 1921, pp. 288-290 R.

DYES. Dyestuffs of the pyrazolone series. M. Johnson. *J. S. C. I.*, August 15, 1921, pp. 176-178 T.

Rapid fast red G L (Griesheim-Elektron). F. M. Rowe and E. Levin. *J. Soc. Dyers and Col.*, August, 1921, pp. 204-205.

HYDROSULPHITES. Hydrosulphites, and their technical applications. N. Chappell. *J. Soc. Dyers and Col.*, August, 1921, pp. 206-210.

FLUORESCENCE. Research on the fluorescence of cellulose and its derivatives. S. J. Lewis. *J. Soc. Dyers and Col.*, August, 1921, pp. 201-204.

ELEMENTS. The relative volumes of the chemical elements. Part II. H. Collins. *Chem. News*, August 19, 1921, pp. 95-97.

OILS. A further contribution to the study of South American oilseeds. G. T. Bray and H. T. Islip. *Analyst*, August, 1921, pp. 325-327.

ACIDITY. Notes on the measurement of hydrogen ion concentration. G. W. Monier-Williams. *Analyst*, August, 1921, pp. 315-324.

DYEING. Some notes on the dyeing of skins. Part IV. C. Process. *Dyer*, August 15, 1921, pp. 66-67.

BORAX. Borax. A. J. Hall. *Dyer*, August 15, 1921, pp. 68-69.

CAUSTIC SODA. Electrolytic caustic soda. Part V. R. Sansone. *Dyer*, August 15, 1921, pp. 72-73.

United States

DRYING. Vacuum drying. C. O. Lavett and D. J. van Marle. *J. Ind. Eng. Chem.*, July, 1921, pp. 600-605.

POTASH. Potash from Kelp. Part IV. Continuous countercurrent lixiviation of charred kelp. J. W. Turrentine and P. S. Shoaff. *J. Ind. Eng. Chem.*, July, 1921, pp. 605-609.

FILTRATION. A study of the fundamental laws of filtration using plant-scale equipment. F. P. Baker. *J. Ind. Eng. Chem.*, July, 1921, pp. 610-612.

SHALE OIL. The thermal decomposition of shales. Part I. Heat effects. R. H. McKee and E. E. Lyder. *J. Ind. Eng. Chem.*, July, 1921, pp. 613-617.

TOXICITIES. Studies on the toxicity of wood preservatives. Part III. C. J. Humphrey, R. M. Fleming and E. Bateman. *J. Ind. Eng. Chem.*, July, 1921, pp. 618-621.

The toxicity of various fractions and combinations of fractions of coal-tar creosote to wood-destroying fungi. H. Schmitz and S. M. Zeller. *J. Ind. Eng. Chem.*, July, 1921, pp. 621-623.

NITROCELLULOSE. Nitrocellulose and its solutions as applied to the manufacture of artificial leather. W. K. Tucker. *J. Ind. Eng. Chem.*, July, 1921, pp. 623-624.

LIGNINS. An experimental study of the significance of "lignin" colour reactions. E. C. Crocker. *J. Ind. Eng. Chem.*, July, 1921, pp. 625-627.

SOLUBILITIES. The solubility of water in gasoline and in certain other organic liquids, determined by the calcium chloride method. C. W. Clifford. *J. Ind. Eng. Chem.*, July, 1921, pp. 631-632.

The calcium chloride method for the determination of water in gasoline and in certain other substances. C. W. Clifford. *J. Ind. Eng. Chem.*, July, 1921, pp. 628-631.

GRAPHITE. Determination of the volatile matter in graphite. O. L. Shinn. *J. Ind. Eng. Chem.*, July, 1921, pp. 633-634.

GENERAL. Incendiaries in modern warfare. Part I. A. B. Ray. *J. Ind. Eng. Chem.*, July, 1921, pp. 641-646.

The chemical industry and trade of Holland. O. P. Hopkins. *J. Ind. Eng. Chem.*, July, 1921, pp. 593-599.

TANNING. The soaking and liming of hides. C. M. Morrison. *J. Amer. Leather Chem. Assoc.*, July, 1921, pp. 345-349.

Tanning materials in the Far East. L. Balderston. *J. Amer. Leather Chem. Assoc.*, July, 1921, pp. 367-374.

ANALYSIS. A modification of the Dumas method, and the application of the Kjeldahl method to the determination of nitrogen in nitronaphthalenes. P. H. M.-P. Brinton, F. M. Schertz, W. G. Crockett and P. P. Merkel. *J. Ind. Eng. Chem.*, July, 1921, pp. 636-639.

Further observations on the Wilson-Kern method of tannin analysis. G. W. Schultz. *J. Amer. Leather Chem. Assoc.*, July, 1921, pp. 349-367.

French

TERPENES. The terpene series. A. Dubosc. *Rev. Prod. Chim.*, August 15, 1921, pp. 461-464.

TELLURIUM. The system bromine-tellurium; tellurium dibromide. A. Damiens. *Compt. rend.*, August 1, 1921, pp. 300-303.

FATS. The oiliness of fatty materials. P. Woog. *Compt. rend.*, August 1, 1921, pp. 303-306.

VANADIUM. The equilibria of tri-, tetra- and penta-valent vanadium in concentrated sulphuric acid solution. V. Auger. *Compt. rend.*, August 1, 1921, pp. 306-308.

ANALYSIS. Detection of nitrogen in organic compounds. C. D. Zenghelis. *Compt. rend.*, August 1, 1921, pp. 308-310.

Estimation of water in oils for transformers. E. Rengade and J. Clostre. *Compt. rend.*, August 1, 1921, pp. 311-313.

KETONES. Preparation of acyclic δ-diketones. E.-E. Blaise. *Compt. rend.*, August 1, 1921, pp. 313-315.

KETO-ENOLIC COMPOUNDS. The additive properties of the keto-enolic double bond. H. Gault and R. Weick. *Compt. rend.*, August 1, 1921, pp. 315-318.

OXIDATION. Syntheses of cyanic acid and urea by the oxidation of organic substances: amides, nitriles and methylcarbylamine. R. Fosse and G. Laude. *Compt. rend.*, August 1, 1921, pp. 318-321.

CATALYSIS. Preparation of a petrol from a vegetable oil. A. Mailhe. *Compt. rend.*, August 8, 1921, pp. 358-359.

The velocity of reaction in the case of hydrogenations be means of platinum black. G. Vavon. *Compt. rend.*, August 8, 1921, pp. 360-362.

ALCOHOLS. Synthesis and dehydration of ethylpropylphenylcarbinol. V. Yéramian. *Compt. rend.*, August 8, 1921, pp. 362-364.

OXYGEN. New revision of the density of oxygen gas. E. Moles and F. Gonzalez. *Compt. rend.*, August 8, 1921, pp. 355-358.

German

HISTORICAL. Dr. William Prout's hypothesis. E. Färber. *Chem.-Zeit.*, August 9, 1921, pp. 757-758.

CELLULOSES. Are hydrocelluloses single substances? H. Ost and R. Bretschneider. *Z. angew. Chem.*, August 12, 1921, pp. 422-423.

STARCH. The constitution of iodo-starch. A. Lottermoser. *Z. angew. Chem.*, August 16, 1921, pp. 427-428.

OILS. Extraction of viscous lubricating oils from coal-tar. F. Schreiber. *Z. angew. Chem.*, August 16, 1921, pp. 425-426.

ANALYSIS. The estimation of metallic sulphides by heating in hydrogen sulphide. Part I. L. Moser and A. Schattner. *Chem.-Zeit.*, August 9, 1921, pp. 758-759.

LIQUID AIR. Liquid air. Part II. K. Schreber. *Chem. Apparatur*, June 25, 1921, pp. 101-104.

CATALYSIS. The influencing of catalysts and specifically active catalysts. E. Abel. *Ber.*, July 9, 1921, pp. 1407-1409.

MAGNESIUM COMPOUNDS. The action of organic magnesium compounds on aryl sulphochlorides. E. Wedekind and D. Schenk. *Ber.*, July 9, 1921, pp. 1604-1612.

The constitution of the Irignard magnesium compounds. J. Meisenheimer and J. Casper. *Ber.*, July 9, 1921, pp. 1655-1665.

OXIDES. The higher oxides of calcium and barium. W. Traube and W. Schulze. *Ber.*, July 9, 1921, pp. 1626-1644.

URIC ACID. The acidity of the hydrogen atoms in uric acid. H. Biltz and L. Herrmann. *Ber.*, July 9, 1921, pp. 1676-1694.

REACTIONS. Conversion of malonic acid into glycine and of methyl-malonic acid into α-alanine. T. Curtinus and W. Sieber. *Ber.*, July 9, 1921, pp. 1430-1437.

Action of sodium arsenite on sulpho-cyanide compounds. A. Gutmann. *Ber.*, July 9, 1921, pp. 1410-1414.

Patent Literature

Abstracts of Complete Specifications

166,657. Cane Sugar and Rum Distilling Industry, Recovery of Potassium Salts from Waste Products in. M. Bird, St. Abbs, Wimbledon, London, S.W. Application date, April 13, 1920.

The liquor obtained after the extraction of sugar from sugar canes and the distillation of rum contains potassium sulphate and potassium chloride. This liquor is caused to flow down the outside of the flues leading from the furnace to the chimney, and thence into metal pots within the flues. The liquor is allowed to remain until evaporated to dryness, and until the organic matter is partly or wholly carbonised. The residue may be used as a fertiliser, or the potassium salts may be dissolved out in a counter current leaching apparatus. The waste liquor is preferably subjected to preliminary neutralisation with lime. About 11 lbs. of ash containing 30 per cent. of potash may be obtained per ton of sugar cane. Reference is directed in pursuance of Section 7, Sub-section 4 of the Patents and Designs Acts, 1907 and 1919, to Specification No. 2,524/1876.

166,659. Muffle Furnaces, Electric. Automatic and Electric Furnaces, Ltd., L. W. Wild and E. P. Barfield, 281, Gray's Inn Road, London. Application date, April 13, 1920.

An electric muffle furnace is made with the top and bottom flat and parallel to one another, and with the ends curved instead of the usual rectangular shape or D-shape. By this means the sagging of the heating element is avoided. Reference is directed in pursuance of Section 7, Sub-section 4 of the Patents and Designs Acts, 1907 and 1919, to Specification No. 13,951/1900.

166,695. Tin, Purification of. J. J. Collins, 9, Leicester Street, Southport, Lancs. Application date, April 20, 1920.

Crude tin is treated with stannic chloride to obtain a solution of stannous chloride, as described in Specification No. 159,659 (*see* The Chemical Age, Vol. IV., page 426). The stannous chloride is freed from water of crystallisation by heating under a slight vacuum out of contact with air. The salt is then fused in an electrolytic cell by heating to about 260°C. and electrolysed, using carbon electrodes. Alternatively, the cell may be formed of cast iron, and may form the cathode, or the molten tin may be used as the cathode. Chlorine is liberated at the anode, and reacts with the stannous chloride, forming stannic chloride, which vaporises, and is condensed in a weak solution of stannous or stannic chloride in a separate vessel. This reaction is exothermic, and the anodes are cooled by water jacketing. Pure tin is deposited at the cathode and may be drawn off, its melting point being lower than that of stannous chloride. The stannic chloride may be used for treating a further quantity of crude tin.

166,711-2. Rust-proofing of Ferrous Metals. The Rust-proofing Syndicate, Ltd., 15, Dean's Yard, London, S.W.1, and T. F. Newman, 2, Anerley Park, London, S.E.20. Application date, April 21, 1920.

166,711. Iron articles are freed from grease by usual methods and then from oxidised scale by immersion in a bath of sulphuric acid, iron sulphate and water. The acid is then neutralised by immersing the articles in a mixture of lime and water, and this is followed by immersion for one second in a solution of copper sulphate and sulphuric acid. This produces a coating of copper, and the acid is then neutralised as before. The articles are then boiled for five minutes in a solution of caustic soda containing granulated tin and a small amount of mercury. A rust-proof coating of tin and mercury alloy is thus obtained. If metallic zinc is also present in the solution, a coating of tin-zinc-mercury alloy is obtained. A further coating of any metal may then be deposited by electrolysis.

166,712. The process is similar to that in 166,711 (above), except that the copper coating is omitted.

166,727. Disinfectants from Sulphurated Shale Oils, Manufacture of. S. Schaefer, 3, Rue Genestre, Luxembourg, and G. Faber, 6, Rue de l'Arsenal, Luxembourg. Application date, April 26, 1920.

Bituminous shale is distilled in a closed vessel in the presence of a large excess of water vapour. The fraction of the oil obtained up to a temperature of 320°C. is mixed with chlorosulphonic acid and heated on a water bath to 100°C. A further quantity of chlorosulphonic acid is then added gradually, the total quantity being equal to that of the oil, and the mixture is heated until the sulphur dioxide and hydrochloric acid gas are driven off. A brown soluble sulpho-acid is obtained, which may be converted into salts by adding the corresponding oxide, hydrate or carbonate of a metal. These salts are colloidal, and may be separated from soluble impurities, such as sulphates and chlorides, by dialysis through a permeable membrane. If crude shale oil is used as the initial material, it may be subjected to preliminary washing with acids or bases. Part of the crude oil remains unsulphonated after treatment, and is removed from the final product. These products are suitable for use as disinfectants.

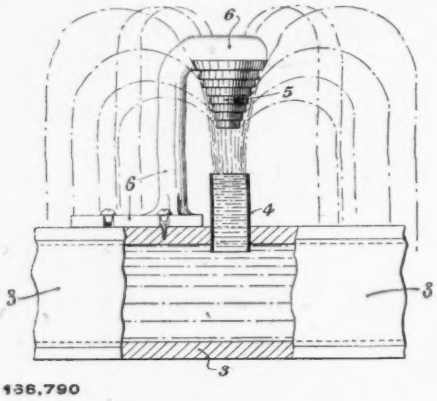
166,767. Cellulose Derivatives, Manufacture of. H. Dreyfus, 8, Waterloo Place, London, S.W.1. Application date, May 13, 1920.

The process is for the manufacture of compounds of cellulose or its conversion products with halogen esters of glycols or of polyhydric alcohols, or of their ethers, whether containing one or more halogens—*e.g.*, ethylene chloride, propylene chloride, ethylene chlorhydrin, propylene chlorhydrin, glyceryl monochlorhydrin and di-chlorhydrin and their isomeric modifications, epichlorhydrin, mono-chlorether. In particular, halogen esters containing one or more free hydroxyls are employed, such hydroxyl groups being retained in the resulting cellulose derivative. Cellulose or its conversion products not soluble in dilute alkali at ordinary temperature are preferably employed, but the process is also applicable to other conversion products, such as alkali cellulose, cellulose hydrates, oxycellulose, viscose, etc. The cellulose or the like should be as little polymerised as possible. In an example, cellulose is impregnated with 50 per cent. caustic soda solution, so that it contains about 4 molecular parts of caustic soda. The cellulose is then kneaded for half an hour with 2 to 3 molecular parts of ethylene chlorhydrin while cooled to 0°C. The mixture is then treated with 6 molecular parts of powdered caustic soda and kneaded with a further 3 to 5 molecular parts of ethylene chlorhydrin. In another example details are given of the reaction with glyceryl monochlorhydrin. Other halogen esters of glycols or polyhydric alcohols or their ethers may be used as well as diluents or solvents such as benzol. The reaction is facilitated by the presence of small quantities of contact substances, such as copper powder, copper salts or hydroxides. Mixed cellulose derivatives may also be produced in which different residues or groups are introduced into the cellulose body either simultaneously or successively. Other mixed cellulose derivatives may be produced which contain also one or more ethyl, methyl or other alkyl group, as described in Specification No. 164,374, or one or more benzyl or homologous groups, or their substitution group or groups derived from xylenes or their substitution products or their homologues, as described in Specification No. 164,375 (*see* The Chemical Age, Vol. V., page 75).

166,790. Cooling Towers or Structures for Cooling Water and other Liquids. F. E. Gill, 4, Spring Hurst Road, Shipley, Yorks., and The Davenport Engineering Co., Ltd., 70, Harris Street, Bradford. Application date, May 31, 1920.

The apparatus is of the type in which water or other liquid is sprayed from upwardly projecting tubes into a cooling stack. The water is supplied from pipes 3 to nozzles 4, each of which is provided with a coaxial stepped cone, 5, supported by a bracket, 6. The lowest step of the cone is of smaller diameter

than the bore of the tube 4, so that the liquid impinges on all the steps of the cone and a very efficient spraying action is produced.



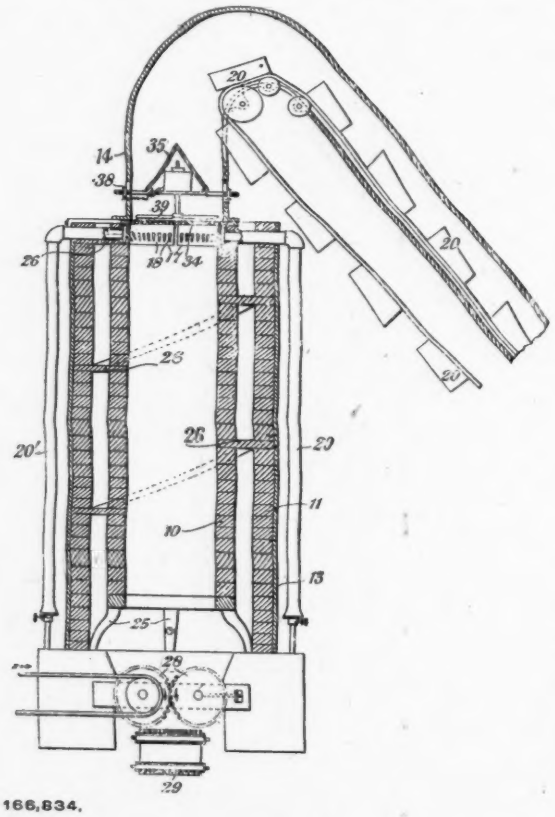
136,790

166,817. ALLOYS. T. Kosugi, 2, Azanakao, Seido-mura, Muko, Hyogo, Japan. Application date, July 15, 1920.

An alloy of great tensile strength and resistance to air, acids and brine consists of copper 75 to 90 per cent., aluminium 7 to 12 per cent., nickel 2 to 7 per cent., and iron 1 to 6 per cent.

166,834. KILNS. J. Nelson, 113, W. Second Street, Ottawa, Kan., U.S.A. Application date, September 6, 1920.

The kiln is for calcining the pulverised ingredients for the manufacture of Portland cement. The inner and outer walls 10 and 11 are formed of fire brick so that an annular heating



166,834.

space 12 is formed. The ingredients are supplied by a conveyor 20 to a conduit 14 and are distributed by a cone 35 to a screen 34. A fan 39 driven by an electric motor 38 facilitates the mixing of the ingredients and their passage through the screen 34. Gas and air are supplied in controlled amount through a pipe 20' to a two part down draught burner 17 having nozzles 18 projecting downwards into the kiln. The cement ingredients are heated by the flame from the burner and the hot combustion products pass downwards through the kiln and between the supporting members 25 into the space 12. A helical baffle 26 is provided in this space to circulate the gases and utilise their heat. The calcined material passes downwards between crushing rollers 28 and is discharged on to an endless belt conveyor 29. The kiln is provided with an outer sheet metal casing 13 to which the screen 34 is secured by means of radial arms 31.

166,818. RESIN, MANUFACTURE OF. H. Wade, London. (From The Barrett Co., 17, Battery Place, New York). Application date, July 15, 1920.

The process is for the preparation of resins from naphtha-containing polymerisable constituents such as coumarone and indene. Naphtha is polymerised by treatment with sulphuric acid, and the polymerised product separated from the acid, neutralised with a solution of alkali, and separated from the alkaline solution. The material is then washed and distilled to remove unpolymerised material, and the resin remains in the still. The naphtha after treatment with acid retains some sulphuric acid and sulphonic acids in suspension, and when the acid is neutralised before distillation a small amount of alkaline solution remains suspended in the oil and does not separate on standing. In the usual process for removing the alkali by washing the neutralised oil repeatedly with water, it is found that an emulsion is formed from which the water separates very slowly on standing. It is now found that this separation is much more rapid if the water used for washing is replaced by ammonium chloride, or a chloride of a metal of the alkali group such as sodium chloride, or a chloride of a metal of the alkaline earth group, such as calcium chloride. Satisfactory results are obtained by using a 3 per cent. sodium chloride solution in the proportion of about 20 per cent. by volume of the naphtha. The time of the washing operation is greatly reduced and the line of demarcation obtained by settling is more distinct so that the loss of material is minimised.

NOTE.—Abstracts of the following specifications which are now accepted appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: 141,374 (H. Frischer and M. Drees), relating to apparatus for effecting reactions between gases and liquids, *see* Vol. II., p. 671; 142,122 (H. Mehner), relating to cyanogen compounds, *see* Vol. III., p. 44; 143,850 (Norsk Hydro-Elektrisk Kvaelstofakteiseskab), relating to ammonium formate produced from barium cyanide; 145,696 (F. J. Collin, Akt.-Ges. zur Verwertung von Brennstoffen und Metallen), relating to producing ammonium sulphate from cyanogen compound obtained by coal distillation, *see* Vol. III., p. 294; 150,709, (R. B. Ransford, L. Cassella & Co.), relating to a colour of the anthraquinone series, *see* Vol. III., p. 634.

International Specifications not yet Accepted

165,408. RESINS, ARTIFICIAL. R. Pummerer, 1, Ainmillerstrasse, Munich, Germany. International Convention date, June 25, 1920.

Phenol or its homologues, or mixtures of these, are oxidised by means of potassium ferricyanide, lead oxide in glacial acetic acid, or ferric chloride, yielding brown resin-like substances. These products may be rendered soluble in alkali by treatment with alkalis, acids, or heat, or they may be reduced to colourless substances which may be rendered insoluble in alkalis by alkylation or acidylation. In an example, *o*-cresol is oxidised with potassium ferricyanide in alkaline solution, and then reduced with zinc dust and glacial acetic acid and reprecipitated by water. The resin may be partly reduced to separate it into fractions of higher and lower melting points. The resin may also be heated to 200°C. *in vacuo*, or reduced with zinc dust and acetic acid or hydrosulphite and caustic soda and heated with acetic anhydride and sodium acetate. The resins form viscous colloidal solutions with benzene, ether, etc.

165,438. SACCHARIN. Soc Chimiques des Usines du Rhone, anciennement Gilliard, P. Monnet, et Cartier, 21, Rue Jean-Goujon, Paris. International Convention date, June 25, 1920. Addition to 153,520.

Specification 153,520 (*see* THE CHEMICAL AGE, Vol. III., p. 664) describes a process for preparing saccharin by oxidising *o*-toluene sulphamide with chromic acid mixed with sulphuric acid of more than 35 per cent. strength. In this invention, iron, chromium, manganese, or their compounds, are added to the oxidising mixture. Preferably the oxidising mixture consists of sulphuric acid, sodium bichromate and iron sulphate or acid chromium sulphate. The latter salt is obtained as a by-product in the process.

165,439. CELLULOSE ESTER COMPOSITIONS. E. I. Du Pont de Nemours & Co., Wilmington, Del., U.S.A. (Assignees of J. M. Kessler, West Orange, N.J., U.S.A.) International Convention date, June 19, 1920.

Cellulose ester compositions and solutions, more particularly those employing pyroxylin as a base, are prepared by the use of a softening agent consisting of an acetin substantially free from monoacetin, and containing 60-70 per cent. of triacetin and 40-30 per cent. of diacetin. In the manufacture of plastic compositions, a volatile solvent such as alcohol or acetone is used, together with camphor or a camphor substitute and a stabiliser such as urea. Acetin is used in the proportion of one-third to one-quarter of the pyroxylin. Solutions are obtained by the addition of methyl alcohol and ethyl, methyl, or other alkyl acetate. Acetin of the desired composition is obtained from a mixture of glycerol with 5-6 molecular parts of glacial acetic acid, with 0·1 per cent. of sulphuric acid as a catalyst. Water is distilled off until an acid of 90 per cent. strength comes over, and the mixture is neutralised with sodium acetate and fractionated in vacuo.

LATEST NOTIFICATIONS.

167,733. Process of and apparatus for obtaining pitch from tar and other heavy oils. Soc. D'Exploitation Des Brevets C. Arnould. August 13, 1920.

167,736. Process of and apparatus for making gas. General Oil Gas Corporation. August 9, 1920.

167,738. Process of separating oils. Trent Process Corporation. August 11, 1920.

167,739. Means for separating solid matter in suspension from a gaseous medium. Powdered Fuel Plant Co., Ltd. August 12, 1920.

167,740. Carbon bleaching or filtering material and method of making the same. Brown, H. E. August 12, 1920.

167,741. Process for the metallurgical treatment of materials containing precious metals. Blei-und Silberhütte Braubach Akt.-Ges. August 12, 1920.

167,752. Method of producing chemically pure hydrochloric acid. Rheinisch-Nassauische Bergwerks & Hütten Akt.-Ges. August 16, 1920.

167,769. Process for the protection of apparatus in the preparation of ammonium chloride. Riedel, A. August 13, 1920.

167,771. Process of and means for tanning hides. Peraditto, V. August 11, 1920.

167,781. Manufacturing of aliphatic dialkylaminolkyl compounds. Farbwerke vorm. Meister, Lucius and Brüning, August 13, 1920.

Specifications Accepted, with Date of Application

142,847. Alloys of silicon with metals of the iron and chromium groups. R. Walter. March 20, 1918.

143,550. Ammonia, Production of. Nitrogen Corporation. March 23, 1916.

144,310. Azo dyestuffs, Manufacture of. W. Carpmael. (*Farbenfabriken vorm. F. Bayer & Co.*) June 3, 1920.

145,585. Gases and vapours, Process and apparatus for electrically separating dust from. W. North. August 27, 1917.

146,287. Coal, Distillation of. F. Fischer. November 13, 1916.

146,936. Blast roasting operations and the like. Mining and Metallurgical Processes Proprietary, Ltd. July 9, 1919.

149,648. Sulphuric acid, Process for the production of. T. Schmiedel and H. Klencke. March 31, 1920.

152,356. Liquids, Purification of. Koppers Co. February 15, 1919.

157,850. Oxyarylaldehydes, Manufacture of. H. Haakh. February 6, 1918.

160,423. Drying material to be ground in revolving drums, Process of and apparatus for. J. S. Fasting. March 22, 1920.

167,195. Decolourising carbon, Process of producing. J. N. A. Sauer. June 11, 1919.

167,199. Viscose, Processes for the treatment of. C. J. Stulemeyer. January 22, 1920.

167,201. Viscose, Processes for making. C. L. Stulemeyer. February 2, 1920. Addition to 167,199.

167,219. Catalytic oxidation, Process of. H. Wade. (Barret Co.) April 1, 1920.

167,313. Sulphur, Purification of. P. Spence & Sons, Ltd., H. Spence and T. J. I. Craig. May 13, 1920.

167,386. Furnaces. W. M. Duncan, July 30, 1920.

Applications for Patents

Akt.-Ges. B. Felder-Clement. Process for manufacture of tungsten carbides without free carbon. 21,662. August 15.

Badische Anilin- & Soda-Fabrik. Manufacture of alcohol. (Germany, February 10.) 21,632. August 15.

Badische Anilin- & Soda-Fabrik. Recovery of valuable products from coal-gases. 21,874. August 17.

Bate, S. C. Manufacture of triarylmethane colouring matters and intermediate compounds for use therein. 21,852. August 17.

British Dyestuffs Corporation, Ltd., Green, A. G., and Saunders, K. H. Manufacture of soluble acid colouring matters and intermediate compounds for manufacture thereof. 21,708. August 16.

" Manufacture of triarylmethane colouring matters and intermediate compounds for use therein. 21,852. August 17.

Chemische Fabrik Rhenania and Projahn, F. Process for manufacture of sulphur from sulphuretted hydrogen. 21,881. August 17.

Deutsche Gold-und Silber-Scheideanstalt vorm. Rössler. Manufacture of sodium peroxide. 22,027. August 19.

Farbwerke vorm. Meister, Lucius & Brüning. Process of preparing aliphatic dialkyl-aminoalkyl compounds. (Germany, September 17, 1920.) 21,649. August 15.

Herzog, E. Manufacture of sodium peroxide. 22,027. August 19.

Jones, W., and Keith, A. M. Disazo dyestuffs. 21,791. August 17.

Langheinrich, M. Purification of graphite. 22,170. August 20.

Plauson, H., and Plauson's (Parent Co.), Ltd. Process of producing lower-boiling hydrocarbons from high-boiling hydrocarbons. 21,693. August 16.

Rushen, P. C. (Akt.-Ges. B. Felder-Clement.) Process for manufacture of tungsten carbides without free carbon. 21,662. August 15.

Techno-Chemical Laboratories, Ltd. Heat treatment of matter for separating liquid therefrom. 22,161. August 20.

Testrup, N. Heat treatment of matter for separating liquid therefrom. 22,161. August 20.

Wolvekamp, M. E. Alkali salts of oxidised protalbinic and lysalbinic acid as stable protective colloids for mercury compounds. 21,763. August 16.

The Late Sir John Brunner

Memorial Unveiled at Chester

ON August 21 in the Matthew Henry Chapel, Chester, Mr. W. Orrett unveiled a tablet to the memory of the late Sir John Tomlinson Brunner, Bart., one of the founders of the firm of Brunner, Mond & Co., Ltd., of Northwich. The tablet bears the following inscription.—

"To commemorate the Rt. Hon. Sir John Tomlinson Brunner, Bart., P.C., born February 8th, 1842, died July 1st, 1919. For 24 years Member of Parliament for the Northwich Division of Cheshire, and 31 years a valuable trustee and generous friend of this Chapel. A worthy citizen and a true supporter of our faith."

The tablet also bears a Masonic emblem. Sir John was the founder and first Master of the John Brunner Lodge, No. 2,799, consecrated by the late Sir Horatio Lloyd, K.C., D.P.G.M., at the Brunner Guild Hall, Winsford, in 1900. He was made Provincial Grand Senior Warden in 1900.

The present Sir John Brunner, Bart., unveiled a Roll of Honour in memory of the members of the congregation who fell in the war, and in honour of those who served.

It may be recollected that the late Sir John Brunner in conjunction with Dr. Ludwig Mond really founded the business in 1872, although the Company was not floated until 1881. They first met by accident, Mond having called on a firm at Widnes where young Brunner was then employed. A friendship resulted and they finally resolved to join forces and start together in business.

Mond had a sulphur recovery process which he wished to introduce and Mr. E. Solvay, of Brussels, came along with a similar process which Brunner, Mond acquired after working his patents under licence for some time.

The firm commenced its operations with 40 workpeople, and as Sir John once confessed to a friend: "Between October, 1873, and December, 1874, everything in the works that could explode did explode, and everything that could break did break. And at the end of that fatal 15 months we had nothing left but our credit. This," added Sir John, with a certain pride, "was good."

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

Market Report

THURSDAY, August 25, 1921.

There has been a fair amount of hand-to-mouth buying during the past week, but the turnover has not attained any very large proportions. The threatened strike of chemical workers is a disturbing feature as far as British-made chemicals are concerned, but as we go to press there seems a chance of the stoppage being averted.

Export inquiry is moderate, but the volume of business is very small.

General Chemicals

ACETONE is in fair inquiry, and the price is firm.

ACID ACETIC.—The price appears to have touched bottom, and several makes being heavily sold, an improvement is not unlikely.

ACID CITRIC remains uninteresting.

ACID FORMIC is unchanged in price, but exhibits an easier tendency on account of the low parity of the German mark.

ACID OXALIC has firmed up again lately, and it would appear that certain low prices which have been indicated are no longer in existence.

ACID TARTARIC is unchanged.

BARIUM CHLORIDE has been in rather better demand, but the tendency is still in buyers' favour.

BLEACHING POWDER remains idle.

FORMALDEHYDE.—Stocks are passing slowly into consumption, and there is a little improvement in price.

IRON SULPHATE is unchanged.

LEAD ACETATE still exhibits a downward tendency; a fair business is reported, and the price is firm.

POTASSIUM CARBONATE remains lifeless, and stocks appear at the moment to be practically unsaleable.

POTASSIUM CAUSTIC.—The position is similar.

POTASSIUM CHLORATE remains in slow demand; price steady.

POTASSIUM PERMANGANATE.—A fair volume of small orders is reported, and the tendency is a little better.

POTASSIUM PRUSSIATE has been in inquiry for export, and as the visible supplies are very limited the article shows a firmer tendency.

SODIUM ACETATE is in much better demand, and an upward movement is indicated.

SODIUM BICHROMATE.—Several second-hand parcels have been taken off the market, and the position is much more favourable.

SODIUM CAUSTIC.—The position at the moment seems to be almost hopeless, and little improvement is to be looked for until foreign markets re-open.

SODIUM HYPOSULPHITE is in good inquiry; price slightly higher.

SODIUM NITRITE.—Rather more business is reported at recent values.

SODIUM PHOSPHATE continues to favour buyers.

SODIUM PRUSSIATE does not show any further decline in price, and with the absorption of spot supplies an improvement may be looked for.

SODIUM SULPHIDE remains featureless.

Coal Tar Intermediates

Trade continues very slowly to expand, although the outlook is much better than stated in our last issue.

There is still a great deal of uncertainty as regards future business, so that both buyers and sellers are acting with every caution.

ALPHANAPHTHYLAMINE is somewhat quiet, but the price remains steady.

ANILINE OIL AND SALT are firm with slightly better business to report.

BETA NAPHTHOL remains dull and in buyers' favour.

DIMETHYLANILINE remains normal.

DYPHENYLAMINE remains steady, but very little business appears to have been transacted.

H. ACID is quiet and easy.

PARANITRANILINE.—Small business is passing and this material shows a firmer tendency, makers adhering strictly to their prices.

RESORCIN is also firmer.

SALICYLIC ACID seems now on the turn in price on account of the slightly better demand.

Coal Tar Products

90's BENZOL.—The demand for motor purposes is still strong and as supplies are scarce prices for prompt delivery remain firm at 3s. to 3s. 2d. in London and 2s. 9d. to 2s. 11d. in the North. For forward delivery there are sellers at a discount which is no doubt prompted by the reduction of the price of petrol.

PURE BENZOL is in poor demand, without change in price.

CREOSOTE OIL.—There is good demand for prompt deliveries which still remain somewhat scarce. Prices are 8¾d. to 9d. in the North and 9d. to 9¼d. in the South.

CRESYLIC ACID.—Recent inquiries have not resulted in much business and the market is somewhat irregular. Pale is quoted at 2s. to 2s. 3d. and Dark at 1s. 10d. to 2s. 2d. per gallon, according to position.

SOLVENT NAPHTHA is quietly steady at 2s. 6d. to 2s. 7d. per gallon for 90/160.

NAPHTHALENE.—The demand is poor, and prices are without change.

PITCH.—Some business has been done during the week for September/December, but the market for export is affected by German competition. To-day's prices are: 80s. to 82s. 6d., f.o.b. London, 75s. to 77s. 6d. f.o.b. East Coast, and 70s. to 75s. f.o.b. West Coast.

Sulphate of Ammonia

The demand for home trade is slow, but there is no change in price. Very little business is being done for export owing to competition of sulphate of ammonia produced in other countries.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	2	1	to	0	2	2
Acetone oil	ton	87	10	0	to	90	0	0
Acetone, pure	ton	90	0	0	to	95	0	0
Acid, Acetic, glacial, 99-100%	ton	60	10	0	to	62	10	0
Acetic, 80% pure	ton	47	0	0	to	49	0	0
Arsenic	ton	95	0	0	to	100	0	0
Boric, cryst	ton	65	0	0	to	68	0	0
Carbolic, cryst. 39-40%	lb.	0	0	6½	to	0	0	7
Citric	lb.	0	2	5	to	0	2	6
Formic, 80%	ton	65	0	0	to	67	10	0
Gallic, pure	lb.	0	4	0	to	0	4	3
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol.	ton	35	0	0	to	37	10	0
Lactic, 60 vol.	ton	40	0	0	to	42	10	0
Nitric, 80 Tw.	ton	38	0	0	to	40	0	0
Oxalic	lb.	0	0	8	to	0	0	8½
Phosphoric, 1.5	ton	50	0	0	to	53	0	0
Pyrogallic, cryst	lb.	0	7	6	to	0	7	9
Salicylic, Technical	lb.	0	1	0	to	0	1	2
Salicylic, B.P.	lb	0	1	4	to	0	1	5
Sulphuric, 92-93%	ton	8	0	0	to	8	10	0
Tannic, commercial	lb.	0	3	6	to	0	3	9
Tartaric	lb.	0	1	4	to	0	1	5½

	per	£	s.	d		£	s.	d
Alum, lump	ton	18	0	0	to	18	10	0
Alum, chrome	ton	37	10	0	to	40	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	12	0	0	to	13	0	0
Aluminium, sulphate, 17-18%	ton	15	0	0	to	16	0	0
Ammonia, anhydrous	lb.	0	2	0	to	0	2	2
Ammonia, .880	ton	43	0	0	to	45	0	0
Ammonia, .920	ton	30	0	0	to	32	10	0
Ammonia, carbonate	lb.	0	0	4	to		—	
Ammonia, chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	50	0	0	to	52	0	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	80	0	0	to	85	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to	0	3	0
Amyl acetate	ton	150	0	0	to	160	0	0
Arsenic, white, powdered	ton	47	0	0	to	48	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0
Barium, chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	16	0	0	to	17	0	0
Nitrate	ton	50	0	0	to	52	0	0
Barium Sulphate, blanc fixe, dry	ton	28	0	0	to	30	0	0
Sulphate, blanc fixe, pulp	ton	16	0	0	to	16	10	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	0
Bleaching powder, 35-37%	ton	14	0	0	to		—	
Borax crystals	ton	31	0	0	to	32	0	0
Calcium acetate, Brown	ton	8	0	0	to	9	0	0
,, Grey	ton	10	0	0	to	11	0	0
Calcium Carbide	ton	27	0	0	to	28	0	0
Chloride	ton	12	10	0	to	13	0	0
Carbon bisulphide	ton	60	0	0	to	62	0	0
Casein, technical	ton	85	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	6	to	0	3	9
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	11	0	to	0	11	6
Oxide, black	lb.	0	16	0	to		—	
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	28	0	0	to	29	0	0
Cream Tartar, 98-100%	ton	125	0	0	to	130	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol	ton	90	0	0	to	92	10	0
Formusol (Rongalite)	lb.	0	3	9	to	0	4	0
Glauber salts, commercial	ton	5	5	0	to	5	10	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	45	0	0	to	50	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	47	10	0	to	49	0	0
Carbonate (White Lead)	ton	43	0	0	to	46	0	0
Nitrate	ton	48	0	0	to	50	0	0
Litharge	ton	32	10	0	to	34	0	0
Lithopone, 30%	ton	27	0	0	to	29	0	0
Magnesium chloride	ton	14	0	0	to	15	0	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	10	10	0	to	11	10	0
Sulphate (Druggists')	ton	15	10	0	to	17	10	0
Manganese, Borate	ton	70	0	0	to	75	0	0
Sulphate	ton	70	0	0	to	75	0	0
Methyl acetone	ton	85	0	0	to	90	0	0
Alcohol, 1% acetone	ton	120	0	0	to	125	0	0
Nickel sulphate, single salt	ton	65	0	0	to	66	0	0
Nickel ammonium sulphate, double salt	ton	67	0	0	to	68	0	0
Potash, Caustic	ton	30	10	0	to	31	0	0
Potassium bichromate	lb.	0	0	9	to		—	
Carbonate, 90%	ton	38	0	0	to	40	0	0
Chloride	ton	36	0	0	to	38	0	0
Chlorate	lb.	0	0	5	to	0	0	5½
Meta bisulphite, 50-52%	ton	120	0	0	to	125	0	0
Nitrate, refined	ton	45	0	0	to	47	0	0
Permanganate	lb.	0	1	2	to	0	1	4
Prussiate, red	lb.	0	2	0	to	0	2	1
Prussiate, yellow	lb.	0	1	2½	to	0	1	3
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	3	5	0	to		—	
Seconds	cwt	3	0	0	to		—	
Sodium acetate	ton	25	0	0	to	26	0	0
Arsenate, 45%	ton	60	0	0	to	62	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	6½	to	0	0	7
Bisulphite, 60-62%	ton	27	10	0	to	30	0	0
Chlorate	lb.	0	0	5½	to	0	0	5½
Caustic, 70%	ton	24	0	0	to	24	10	0
Caustic, 76%	ton	25	0	0	to	25	10	0
Hydrosulphite, powder, 85%	lb.	0	2	3	to	0	2	6
Hyposulphite, commercial	ton	15	0	0	to	16	0	0
Nitrite, 96-98%	ton	40	0	0	to	42	0	0

	per	£	s.	d.		£	s.	d.
Sodium Phosphate, crystal	ton	23	0	0	to	25	0	0
Perborate	lb.	0	1	8	to	0	1	9
Prussiate	lb.	0	0	6¾	to	0	0	7
Sulphide, crystals	ton	17	0	0	to	18	0	0
Sulphide, solid, 60-62%	ton	23	0	0	to	24	0	0
Sulphite, cryst	ton	15	0	0	to	16	0	0
Strontium carbonate	ton	80	0	0	to	85	0	0
Strontium Nitrate	ton	84	0	0	to	90	0	0
Strontium Sulphate, white	ton	7	10	0	to	8	10	0
Sulphur chloride	ton	41	0	0	to	42	0	0
Sulphur, Flowers	ton	13	0	0	to	14	0	0
Roll	ton	13	0	0	to	14	0	0
Tartar emetic	lb.	0	1	5	to	0	1	6
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Tin Perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	5	to	0	1	6
Zinc chloride, 102 Tw.	ton	21	0	0	to	22	10	0
Chloride, solid, 96-98%	ton	50	0	0	to	55	0	0
Oxide, 99%	ton	40	0	0	to	42	0	0
Dust, 90%	ton	47	10	0	to	50	0	0
Sulphate	ton	21	10	0	to	22	10	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	3	6	to	0	3	9
Alphanaphthol, refined	lb.	0	4	0	to	0	4	3
Alphanaphthylamine	lb.	0	2	6	to	0	2	8
Aniline oil, drums extra	lb.	0	1	5	to	0	1	6
Aniline salts	lb.	0	1	6	to	0	1	7
Anthracene, 40-50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	4	3	to	0	4	6
Benzidine, base	lb.	0	6	0	to	0	6	6
Benzidine, sulphate	lb.	0	6	6	to	0	7	0
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzoate of soda	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	7	3	to	0	7	6
Betanaphthol	lb.	0	2	6	to	0	2	9
Betanaphthylamine, technical	lb.	0	9	6	to	0	10	0
Croceine Acid, 100% basis	lb	0	4	6	to	0	5	0
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	6	9	to	0	7	6
Dinitrobenzol	lb.	0	1	5	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Dinitronaphthaline	lb.	0	1	6	to	0	1	8
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	4	0	to	0	4	3
Diphenylamine	lb.	0	4	6	to	0	4	9
H-Acid	lb.	0	9	0	to	0	10	0
Metaphenylenediamine	lb.	0	5	6	to	0	5	9
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	7	0	to	0	7	3
Monosulphonic Acid (2:7)	lb.	0	7	0	to	0	7	6
Naphthionic acid, crude	lb.	0	4	0	to	0	4	3
Naphthionate of Soda	lb.	0	4	3	to	0	4	6
Naphthylamin-di-sulphonic-acid	lb.	0	4	9	to	0	5	0
Nitronaphthalene	lb.	0	1	4	to	0	1	5
Nitrotoluol	lb.	0	1	3	to	0	1	4
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	2
Orthotoluidine	lb.	0	2	3	to	0	2	6
Orthonitrotoluol	lb.	0	0	10	to	0	1	0
Para-amidophenol, base	lb.	0	12	0	to	0	12	6
Para-amidophenol, hydrochlor	lb	0	12	6	to	0	13	0
Paradichlorbenzol	lb.	0	0	7	to	0	0	8
Paranitraniline	lb.	0	4	6	to	0	4	9
Paranitrophenol	lb.	0	2	9	to	0	3	0
Paranitrotoluol	lb.	0	5	9	to	0	6	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	13	0
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	3	9	to	0	4	0
Resorcin, technical	lb.	0	7	0	to	0	7	6
Resorcin, pure	lb.	0	9	6	to	0	10	0
Salol	lb.	0	2	6	to	0	2	9
Sulphanilic acid, crude	lb.	0	1	4	to	0	1	6
Tolidine, base	lb.	0	6	6	to	0	7	0
Tolidine, mixture	lb.	0	2	6	to	0	2	9

According to a report issued by the Dominion Bureau of Statistics there were 14 establishments producing COMPRESSED GAS IN CANADA in 1918. This industry has developed into one of considerable commercial importance, and represents a capital investment in plant and equipment of nearly two million dollars. It is stated that 34 million cubic feet of oxygen was produced during the year, and that more than 5 million cubic feet of acetylene was also made.

Benn Brothers' Annual Meeting

Sir John Benn on Conditions of Commercial Prosperity

The annual meeting of the shareholders of Benn Brothers, Ltd. (proprietors of *The Chemical Age* and numerous other trade and technical journals), was held yesterday (Friday) at 8, Bouverie Street, E.C.

The Chairman's Speech

In moving the adoption of the report and balance sheet the chairman (Sir John Benn) said :

Our accounts, presented herewith, faithfully summarise the gratifying figures for the past year. They cannot, however, give any adequate idea of the great amount of loyal and painstaking labour involved in producing the numerous publications owned by the Company. They make clear that to secure anything like pre-war profits a largely increased turnover is now indispensable. This year, as the net result of their considerable investment, the shareholders receive a sum of £11,307. To secure this, no less than £180,000 has passed, in one way or another, to wage-earners, and approximately £20,000 to the National Treasury. Reductions of wages are in the air. and it may be perhaps assumed that this £180,000 will grow less. I do not think so. It is true that this large item represents the highest wage standard extant in our industry, but in my judgment any wage reduction will really result in a total increase of this labour item. Since the Armistice all publishing business has been greatly handicapped by the extravagant cost of materials and production. Once these costs again approximate to the normal we shall be encouraged largely to extend our operations and so largely to increase our contribution to the total wages fund. There is, indeed, no limit to the expansion of our activities once reason is restored in the cost of paper and printing. Our aim has been not only to keep up our modest dividend, but to sell our journals and advertising space at, approximately, pre-war rates. The enterprise which tries to save itself by putting up prices is in peril, as some current public examples show. It is true that we are doing a business of, roughly, a quarter of a million a year, and our dividend is much the same as when we did half that turnover. But this broadening of our base is, I am sure, all to the good.

Thanks to an accomplished and indefatigable staff, so largely in partnership with us, we are, despite the devastating war period, in a position never excelled in our history. Nowadays the business man is so oppressed by the daily inquisition of an assertive bureaucracy that he has neither the time nor the inclination to consider the general outlook. The present rate and manner of taxation offers a premium to bankruptcy and unemployment. As an example there is this recent Corporation Tax. It introduces a new trade-destroying principle into taxation. It is a tax upon industry as industry, and that upon the most beneficent part of industry, namely, joint-stock enterprise.

A Barometer of British Industry

Our publishing undertaking may claim to be a barometer of British industry. As adding to this world knowledge I refer, with no little pleasure, to the visit to America paid by our Managing Director. America is a country which has set an example to the world in her quick recovery from war-time measures. Our Managing Director's careful and authoritative reports on commercial conditions there have proved and continue to prove of inestimable value to us. America, of course, has her own methods, and I am not convinced that they are always necessarily applicable to our own problems, but one clear point seems to have been revealed by every American business man with whom Mr. Benn came in contact, and that was that no such recovery could have been made if American commerce had been handicapped as British commerce is handicapped by State interference and taxation on our scale.

If the State devotes its energies to a wise economy instead of harassing business in this and like manner the barometer will soon show "set fair." The trade of this country has passed through a period which may be described as little short of revolution, and yet its framework remains intact. Industrial master men, whether in the counting house or the workshop, are growing to understand and trust each other, and higher production is in sight. Such a wise pull-together policy will mean vast and growing prosperity for this nation of shopkeepers. The statesmanlike attitude of the great majority of trade-union bodies towards the re-adjustment of values now taking place gives the firmest assurance of determination to maintain our British reputation as the leaders of the industrial world.

Bureaucracy Must Go

It is not to labour but in another direction that we have to look for the greatest obstacle to activity and progress which now bars the industrial path. The bureaucrat must be swept out of the way. It is not so much a question of anti-waste as anti-humbug. The waste is bad enough, but the humbug is far worse. Every business man can give numerous instances of openings for trade and employment of which he can make no use because he does not know and cannot discover what are the regulations that stand in his way. There is a good deal of talk of the safeguarding of industries. English commerce has for centuries provided all the safeguard that the nation has enjoyed, and does not now require to be safeguarded at its own expense by the eighty Government Departments which never have and never will and never can do anything to facilitate that progress and expansion upon which the well being of every one of us depends.

The public, when it thinks of trade and industry, is apt to forget that the bulk of our business is not transacted by the big and successful concerns who monopolise the commercial reports in the newspapers, but by the 20,000 house furnishers, the 24,000 ironmongers, the 40,000 fruit-growers, and the hundreds of thousands of small tradesmen out of whom will come the big concerns of the next generation. A large proportion of the time of all these people is still occupied in answering the questions of functionaries who were appointed to win the war and remain to lose the peace. The time has come to adopt a new slogan, not anti-waste, for that is merely negative, but a more comprehensive motto, which will include this desirable purpose and build upon it. "Back to business" should be our watchword, and if we adopt it and act upon it now, the world is at our feet. We have every reason to join the optimists.

The report (showing a profit of £24,836 and providing for a dividend of 15 per cent. for the year) was adopted, and Mr. F. H. Elliott and Mr. C. E. Hughes were re-elected directors.

Future of Alsatian Potash Mines

WRITING from Paris, a correspondent of the *Daily Telegraph* states that there is a fear that France will be robbed of three-fourths of the potash mines in Alsace as the result of the judgment of the Mulhouse Court on July 29. Naturally there will be an appeal against this judgment, and it will be put forward by Senator Helmer, who was appointed administrator of the mines when they were placed under sequestration, and also by the Procureur-Général of Strasbourg. In order to account for the fears by which France is obsessed, he states, it is necessary to indicate what has happened before and since the Armistice. The Alsatian potash mines were exploited by four companies—one Alsatian-French, which worked a third of the total, the other three German. On January 6, 1919, the French Government put the German concessions under sequestration. Just before the Armistice Henri Koch, a manufacturer at Guebwiller, said to be of Dutch nationality, entered into negotiations for the purchase of the interest of the German company which owned the largest concession, and three days before the mines in this area were placed under sequestration he acquired these shares for 49,000,000 f. Senator Helmer had doubts about the transaction. The Procureur-Général of Mulhouse issued an order the effect of which was that Senator Helmer had to recognise the property of Koch, and the Mulhouse Court subsequently confirmed this decision, emphasising that Koch was of Alsatian stock, and that two of his sons had fought in the French army. The shares of another German company were bought under the same conditions by Van Houten. The capital of the mines acquired by Koch and Van Houten is put at 65,000,000 f., and that of the Alsatian-French mines at 10,000,000 f. As was to be expected, the German Press has welcomed with joy the judgment of the Mulhouse tribunal.

TRADE GUIDE

CHEMICAL AGE

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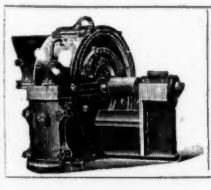

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THE Trade Guide is a compact and handy form of reference to a representative list of firms engaged in various branches of the Industry. In most cases fuller particulars may be found by referring to the displayed advertisement elsewhere.

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Company News

GOODLASS, WALL & CO., LTD.—The transfer books are closed from August 25 to September 7.

INTERNATIONAL PAINT & COMPOSITION CO.—The preference transfer register is closed from August 22 to August 31, inclusive.

UNITED TURKEY RED.—The directors regret that they do not feel justified in declaring an interim dividend on the ordinary shares of the company in view of the unprecedented fall in values and the uncertain state of the industrial world. An interim dividend of 2¾ per cent., tax free, was paid in September last.

DAILUAINE-TALISKAR DISTILLERIES.—The report states that after providing for depreciation and liability under the Finance Act, the profit is £25,780, and £6,149 was brought in. The directors recommend a dividend of 10 per cent. on the ordinary shares for the year, placing £8,000 to reserve, and carrying forward £8,015. Last year a dividend of 8 per cent. was paid, £2,000 placed to reserve, and £6,770 carried forward.

RIORDON PULP & PAPER CO.—Plans for the reconstruction of the Riordon Pulp & Paper Co. have been submitted at a private meeting of creditors at Montreal. Under the proposals, which call for a new $8,000,000 to $10,000,000 (£1,600,000 to £2,000,000) bond issue, the present shareholders will lose their present holdings, but have the right to subscribe to the new issue of bonds carrying a bonus of new stock. It is understood that the directors are willing to subscribe $1,000,000 (£200,000) of the new amount, while $1,500,000 (£300,000) is promised by interested companies.

BENN BROTHERS, LTD.—The profit for the year ended June 30 last amounted to £24,836, making, with £5,710 brought in, an available balance of £30,547. The directors' percentages are £4,986, and it is proposed to add £2,000 to general reserve, increasing that fund to £8,000. Income tax paid for the year ended April 5, 1921, required £3,800, and the dividend of 15 per cent., less tax (against same), on the ordinary shares absorbed £11,307, leaving £8,453 to be carried forward. A report of the annual meeting, which was held yesterday (Friday) at 8, Bouverie Street, E.C.4, appears on another page.

LEVER BROTHERS, LTD.—A Stock Exchange announcement authorises, under Rule 148*a*, dealings in 328 seven per cent. preference shares of £1 each, fully paid, Nos. 23,560,108 to 23,560,435; and 27 eight per cent. "A" preference shares of £1 each, fully paid, Nos. 15,468,276 to 15,468,302. These securities will rank *pari passu* with those in which special settling days have already been appointed, as soon as they are identical and the certificates are ready for distribution, and with those for which an official quotation has already been granted as soon as they are identical and are officially quoted.

W. J. BUSH & CO., LTD.—Speaking at the annual meeting on August 18, Mr. J. M. Bush (chairman and managing director) said the sum appearing in the accounts as available for disposal, including the amount brought forward, was £76,121 4s. 4d., out of which it was proposed to pay a dividend of 5 per cent. on the ordinary shares. The balance, amounting to £63,521 4s. 4d., which it was proposed to carry forward, was amply sufficient to provide for liabilities for excess profits duty and corporation profits tax. The motion, which was seconded by Dr. P. C. C. Isherwood, was unanimously adopted. An account of the chairman's speech appears on another page.

KEELINGS OXIDES (1921), LTD.—Applications are invited by this company for an issue at par of 90,000 10 per cent. cumulative preference and 45,000 ordinary shares, all of £1 each. The directors and their friends have applied for at par, and will be allotted, £45,000 in shares of this issue. The company has been formed to acquire as a going concern, and to extend and develop, the manufacture of zinc and other metallic oxides carried on by Keelings Oxides, Ltd., of Stoke-on-Trent. The company's works, the prospectus states, are well situated and equipped, and it is intended out of the proceeds of the present issue at once to double the zinc oxide plant, and further plant will be put down as and when required. The prospectus states that there is a wide and increasing demand both at home and abroad for zinc oxide of the qualities which are produced by the company. The capital is £250,000, divided into 100,000 ten per cent. cumulative preference and 150,000 ordinary shares, all of £1 each. The total purchase price payable to the vendor to the company is £122,500, payable as to £55,000 in cash and the balance of £67,500 in 10,000 preference and 57,500 ordinary shares, all of £1 each and all issued as fully paid up. The shares now offered will be allotted in the proportion of two preference shares to one ordinary share, or in corresponding multiples. Offers for one class of shares only will not be entertained. The subscription list, which was opened on Tuesday, will close on or before August 30.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT	MATERIALS.	REF. NO.
British India	Varnishes. Replies should be addressed to the Secretary of the Company, 29-30, Nicholas Lane, London, E.C. 4.	—
Toronto ...	Druggists' sundries...	153
Far East: Burmah, Malaya, Siam, French China, Dutch East Indies.	Dyes; paints; varnishes; fertilisers; soaps.	169
Australia ...	Glassware. Replies should be addressed to the Official Secretary, Commonwealth of Australia, Commercial Information Bureau, Australia House, London	—
Montreal ...	Soaps	—
Johannesburg	Creosote. Replies at the Dept. of Overseas Trade, 35, Old Queen Street, London	—
Zurich ...	Jute	—

Tariff Changes

AUSTRALIA.—The Melbourne correspondent of the *Manchester Guardian Commercial* reports the following changes in the new Australian Tariff:—The United Kingdom rate of 25 per cent. on soda crystals has been reduced to 20 per cent.; the higher and alternative *ad valorem* rates on carbonate and bicarbonate of soda and soda silicate are not to operate until on and after January 1, 1922; on soda ash October 1, 1922, on caustic soda October 1 next, while the duties on citric acid, scheduled as U.K. free, intermediate 5 per cent. and general 10 per cent., are to be, on and after January 1, 1922, U.K. 25 per cent., intermediate 35 per cent., general 40 per cent. An alteration in respect to alum—item 281, (*c*)—makes alum cake, per ton: U.K. £2, intermediate £3, and general £3, instead of 20, 25, and 30 per cent. *ad valorem* respectively, and sulphate of alumina, including alumina ferric, is separately rated at, per ton, U.K. £4, intermediate £5 10s., general £5 10s. Chlorate of potash is made free from all sources. A large variety of roots, barks, and leaves are now separately set out and made free from all sources. To the fixed rates for perfumes (synthetic), essential oils, &c.—item 290 (E) (1 and 2)—alternative *ad valorem* rates of 20, 25, and 30 per cent. have been added.

CZECHO-SLOVAKIA.—A copy of an Order introducing a number of modifications in the Customs Tariff and the method of assessing Customs duty may be seen at the Tariff Section of the Department of Overseas Trade, 18, Queen Anne's Gate, S.W. 1. In the case of the following goods the Order imposes an import duty or increases the rates of duty formerly in force:—Dyeing extracts; pitch; crude oil for making lubricants; fireproof magnesite and bauxite bricks; raw zinc and lead and nickel anodes.

GERMANY (OCCUPIED TERRITORY).—Copies of a list of goods which may be imported without licence across the eastern and western frontiers of the Occupied Territory, and a list of the goods which may be exported without licence from Occupied to Unoccupied Germany, may be seen at the Tariff Section of the Department of Overseas Trade.

TRADE GUIDE

CHEMICAL AGE

The Future of Gretna

"H.M. FACTORY, Gretna, which was laid out and equipped during the war for the complete production of cordite on a very large scale, will be handed over to the Disposal Board on August 31. As soon as possible thereafter it will be offered for sale by private treaty in one lot in the first instance." This statement was made to a representative of the Press Association by Sir Howard Frank, chairman of the Disposal and Liquidation Commission, who added: "The decision to dispose of the property in one lot has been taken because of its potentialities for industrial production on the largest possible scale under the most favourable conditions as regards site, equipment, room for extension, and proximity to ore and coal fields, as well as to important sea ports and business centres. The property to be sold covers an area of approximately 4,300 acres, and is situated on the north shore of the Solway Firth, some nine miles from Carlisle on the Glasgow and South-Western, Caledonian, and North British Railways. There are two stations on the estate." "Gretna," said Sir Howard, "possesses sufficient plant, power, and water installations, transport and communication facilities, and housing accommodation to meet all the requirements of a self-contained industrial community."

Recent Wills

Mr. G. A. Gilroy, of Glutto, Cupar, Fife, chairman and managing director of Gilroy, Sons & Co., Ltd., jute merchants, and a director of the Jute Industries, Ltd. £246,926

Mr. W. F. Burdekin, of 4, Green Park, Darlington, chemist £5,300

Mr. A. Wylie, of Cordale, Benton, Dumbarton, a director of the British Alizarine Co., Ltd., formerly a dyer and calico printer £50,537

LARGE deposits of OSMIRIDIUM have been discovered in the valleys of the large rivers of the western division of Tasmania, which is the sole producer on a large scale of point metal osmiridium. Tasmania, Russia, Colombia, and Papua are the four principal osmiridium producing countries of the world, and Tasmania is said to be by far the most important of these. In 1910 Tasmania produced 120 ounces of osmiridium, valued at £530. In 1919 the production was 1,669 ounces, valued at £39,614, and for the first half of 1920 the production was 1,093 ounces, valued at £41,642.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Partnership Dissolved

JUKES, NORRIS STAFFORD, and RICHARDSON, RENNIE ANGLEZARK, manufacturing chemists, 15A, Granby Row, Manchester, under the style of the Cyclone Manufacturing Company, by mutual consent as from August 18, 1921. Debts received and paid by N. S. Jukes.

Bankruptcy Information

FULFORD, ARTHUR, carrying on business as A. Fulford & Co., at 71, Bowdon Street, Sheffield, wholesale druggist. Date of receiving order, Aug. 17. Debtor's petition.

Company Winding Up

BRITISH PHOSPHORISING & CASTING COMPANY, LTD. A petition for the winding-up of this company was presented on August 12, and is directed to be heard at the Court House, Corporation Street, Birmingham, on Thursday, September 15, at 10.30 a.m. Any person who intends to appear on the hearing of the said petition must give notice in writing to Wright & Marshall, 86, New Street, Birmingham, solicitors for the petitioner.

Company Winding Up Voluntarily

FERRATE MANUFACTURING COMPANY, LTD. Arthur Beamish, chartered accountant, 27, Regent Street, S.W.1, appointed liquidator.

Liquidator's Notice

LEEDS PHOSPHATE WORKS, LTD. General meeting at the offices of Walter Scott, Ltd., 21, Grainger Street West, Newcastle-upon-Tyne, on Wednesday, September 28, at 12 noon, to receive report of winding up.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of* 1908, *provides that every Mortgage or Charge, as described therein, created after July* 1, 1908, *shall be registered within* 21 *days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July* 1, 1908, *require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

CARLTON BLEACHING & DYEING CO., LTD., Carlton (Notts).—Registered August 15, mortgage, to London Joint City & Midland Bank, Ltd., securing all moneys due or to become due to the bank; charged on land with bleach and dye works thereon at Carlton. *Nil. July 14, 1920.

EAST ANGLIAN CHEMICAL CO., LTD., Sutton Bridge, (Lincs.).—Registered August 12, mortgage securing £1,000 and further advances, not exceeding in all a total of £2,500, to M. H. Wilson & Sons, Ltd., 28, Old Market Street, Wisbech; charged on premises at Sutton Bridge, fixed machinery, &c., and uncalled capital. *Nil. July 10, 1920.

TAYLORS' DRUG CO., LTD., Leeds.—Registered August 11, £1,200 mortgage, to Mrs. E. Speight, 101, Harrogate Road, Leeds; charged on land, with messuage and shop thereon, at Monkwearmouth Shore. *£61,669 17s. 11½d. October 25, 1920.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

DERRY CHEMICAL CO., LTD., North British and Mercantile Buildings, East Parade, Leeds, chemical manufacturers. £25 5s. 6d. June 25.

BLUNT, W. H., & SON, 69½ and 70, Snow Hill, Birmingham, druggists. £28 0s. 2d. June 29.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 *and* 117, *Chancery Lane, London, W.C.*2 :—

BALTIC OIL ESTATES SYNDICATE, LTD., 85, London Wall, E.C.2. To search for, and win oils, minerals and natural gas. Nominal capital, £50,000 in 35,000 ordinary shares of £1 each and 300,000 deferred ordinary shares of 1s. each. Directors: H. G. O. Bax-Ironside, H. M. Ommanney. Qualification of directors, 100 shares. Remuneration of directors, £200 each; chairman, £250.

BYPRODUCTS EXTRACTIONS, LTD., Donington House, Norfolk Street, Strand, W.C.2. To acquire an invention in relation to the treatment, application or use for commercial utility or scientific purposes of sewage and other waste. Nominal capital, £10,000 in 10,000 ordinary shares of £1 each. Directors: H. L. Davis, W. Hunt, A. Lyle-Samuel, M.P., G. Sievwright, N. Sievwright. Qualification of directors, 1 share. Remuneration of directors, £100 each.

COMMERCIAL SOLVENTS CORPORATION, 10a, Featherstone Buildings, High Holborn, W.C.1. (Incorporated in Maryland, U.S.A.). To manufacture and generally deal in and with chemicals, solvents, fertilisers, paints, &c. Nominal capital: the capital stock of this Corporation shall consist of 70,000 shares, of which 30,000 shares shall be preferred stock and shall be of par value of 100 dollars each and 40,000 shares shall be common stock, having no par value. Name of person authorised to accept service: W. A. Burton, of the above address.

HULL BOTTLE & GLASS CO., LTD., 55, Cumberland Street, Hull. Glass and bottle manufacturers. Nominal capital, £10,000 in 10,000 shares of £1 each. Directors: E. Owbridge, F. W. Owbridge, W. A. Turner. Qualification of directors, 1 share.

LUBRICATING OIL RECOVERY CO., LTD., 65/66, York Terrace, N.W. Clarifying and treatment of waste of other oils. Nominal capital, £3,000 in 3,000 shares of £1 each. Directors: G. L. George, H. Hey, W. A. Street, W. H. Shorter. Qualification of directors, £25. Remuneration of directors, £100 each.

MONORK VULCANISING (COLD PROCESS) CO., LTD., Central House, 34/36, Oxford Street, W.1. To carry on the business of growing and dealing in rubber or any substitute and repairing or dealing with goods manufactured from rubber or any substitute. Nominal capital, £2,000 in 500 preference ordinary shares, and 1,500 ordinary shares of £1 each. Directors: P. R. Greenwood, W. E. Swainston, J. F. L. Smith, A. E. Raymond. Qualification of directors, 500 shares.

NATIONAL FUEL OIL CO. (1921), LTD., 10, King Edward Mansions, Shaftesbury Avenue, W.C.2. Producers, refiners, distillers, storers and buyers and sellers and dealers in petroleum and other oils. Nominal capital, £150,000 in 150,000 shares of £1 each. Minimum subscription, £7. Directors: N. Lentice, H. N. Robinson, P. Still, G. Wallis, W. E. G. Hudson-Hobden, F. B. Warner, C. S. Hunting. Qualification of directors, £100.

Catalogues Received

We have received from Joseph Baker Sons & Perkins, Ltd., of Kingsway House, Kingsway, W.C.2, an attractively-printed sixteen-page brochure describing their patent speed gears which embody a special adaptation of the epicyclic principle. The gear includes a starting clutch, operated by a hand wheel and contained in the gear box, by means of which the load may gradually be put on after starting the motor. A flexible coupling is fitted between the motor and gear. This brochure cancels all former catalogues dealing with this type of machinery.

W. H. Dorman & Co., Ltd., of Stafford, send us a catalogue of the Dorman patent "Flexstel" flexible steel piping for high and varying pressures; for water, oil, gas, air and saturated or superheated steam, &c. It is claimed for it that it is practically indestructible and everlasting, is leak-proof and is suitable for compressed air, steam or water when made from steel, or for acids when made from brass or bronze. It is also made in duralumin for special purposes, such as wave transmission, where reduction of weight is of importance.